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Tahoe National Forest
Truckee Ranger District

Purpose of and Need for Action and Proposed Action

DRY CREEK PROJECT

Table of Contents

List of Figures and Tables

Dry Creek Project

Purpose of and Need for Action and Proposed Action

Tahoe National Forest – Truckee Ranger District
Nevada and Sierra Counties, California

Introduction

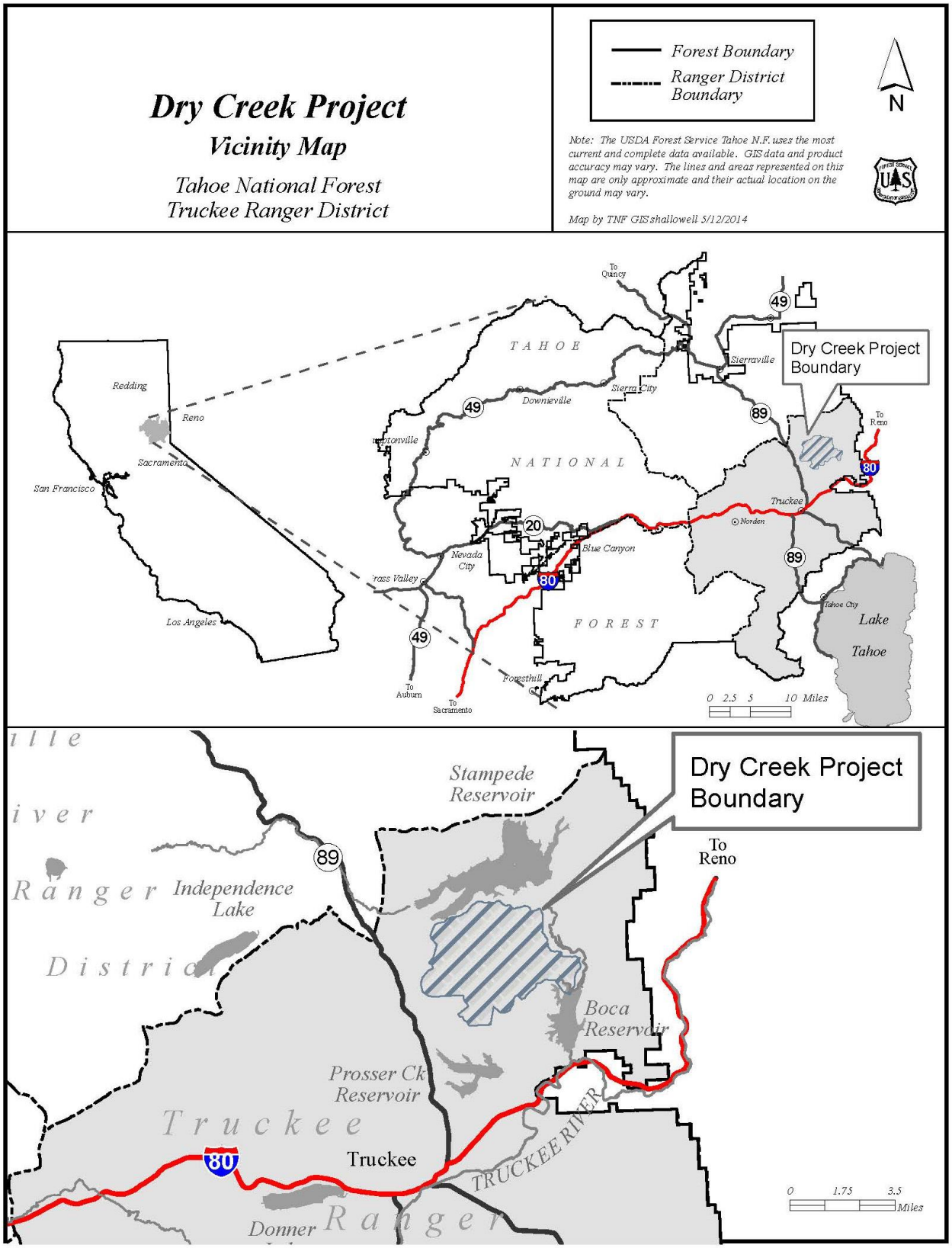
The Dry Creek Project was initiated as a result of recognized degradation of the overall forest ecosystem and hydrologic functions in the Dry Creek watershed. The area is characterized by early era logging and railroad grades, pockets of high severity historic wildfire with post-fire salvage logging, terracing, and uniform plantings, all of which have contributed to a complex, modified landscape. The area has also seen substantial road construction. With residential development, the establishment of utility corridors for gas, electricity and fiber optics, and reservoir construction and operation, the area is now a mosaic of developed and wildland interface. It has also become a popular location for outdoor recreation enthusiasts, including equestrians, off- highway vehicle users, mountain bikers and hikers.

All of these activities have contributed to degradation of the hydrologic function and the overall health of the Dry Creek watershed area and its associated forest ecosystem. In 2013, the Dry Creek Watershed Assessment (USDA 2013), a formal assessment of the watershed condition was conducted to provide an overview of the current condition of the watershed in the light of past activities and impacts. It identified opportunities for restoration actions that would reduce sediment production, improve hydrologic connectivity and function, and improve the overall health and resiliency of the natural resources in the watershed.

The Dry Creek Watershed Assessment identified more than 30 specific areas where improvements to roads, drainage networks, and stream channels would slow or stop erosion. Many of the identified improvements are associated with roads and have already been or are planned to be completed with standard road maintenance activities. Other recommended improvements, especially those for forest ecosystem (ecological) restoration and watershed/road improvement projects are being considered in the Dry Creek Project. Opportunities exist to implement condition-specific vegetation treatments that would improve the vigor of plantations, increase the overall forest resiliency to fire, disease and climate change by increasing heterogeneity, and to identify areas that can be treated by a reintroduction of prescribed fire. Watershed improvement opportunities focus on actions to improve watershed condition, reduce sediment delivery to streams, improve hydrologic function of the meadows, streams and upland areas, and reduce erosion on roads.

To address forest ecosystem health and resiliency of the Dry Creek Project area, the planning for this project built heavily on the results of a formal collaborative process for the Sagehen Project, (see http://www.fs.usda.gov/projects/tahoe/landmanagement/projects for more information on the Sagehen Project). The Dry Creek Project further incorporated the results of the previous collaboration, science, and forest management in a novel and adaptive way. The proposal put forth in this document is the result of an effort to design an integrated, innovative approach for applying the most recent science to enhance forest resilience, restore forest stand ecological conditions, manage fire and fuels, and provide habitat elements important to wildlife on National Forest System (NFS) lands within the Dry Creek project area.

Figure 1: Vicinity Map



Background of the Dry Creek Project Area

General Current Setting

The Dry Creek project area is located approximately nine miles north of the Town of Truckee, California on the east side of Highway 89. Locally, the overall project area is also referred to as Russel Valley. The project area is largely included in the Dry Creek watershed. The Dry Creek watershed is a Hydrologic Unit Code (HUC) 7 drainage nested within the Little Truckee River – Boca Reservoir sub-watershed. The Dry Creek project area is located predominantly in Nevada County, California with a small portion in southern Sierra County. The watershed drains to the south into the Little Truckee River system via the northwestern portion of Boca Reservoir. The project area encompasses primarily the Dry Creek watershed, but also small portions of four other watersheds. The overall project area is approximately 8,154 acres in size, of which 930 acres are private land. Overall, 1,889 acres are in the Dry Creek watershed, 11 acres fall within the Stampede Reservoir watershed to the northwest, 233 acres in the Prosser Creek Reservoir watershed to the southwest, 225 acres in the Boca Reservoir watershed to the southeast, and 413 acres in the Lower Sagehen Creek watershed to the west/northwest. The Dry Creek watershed itself is 7,304 acres in size. The area has mostly flat to moderately steep terrain, with steeper upper slopes draining into broad flat valley bottoms. Elevations range from approximately 5,600 feet, where the outflow enters Boca Reservoir, up to 6,994 feet at the top of Billy Hill on the northwest boundary of the project area. However, the majority of the area is between 5,800 and 6,200 feet in elevation. The project area encompasses the community of Russel Valley and borders the community of Tahoe Timber Trails.

Approximately 89 percent of the land within the project area is managed by the Forest Service, with approximately 11 percent managed by other entities or owned privately. Much of the privately-owned land is residentially developed to various extents, mostly in large acreage parcels. Some of the private parcels are managed as forest. Several utility corridors pass through the project area including multiple electric transmission and distribution lines, a buried fiber optic line, and a buried petroleum pipeline. The area is popular with dispersed recreationists. Uses include motorcycle riding, mountain biking, road biking, horseback riding, snowmobiling, cross country skiing, and driving for pleasure. The area includes both the historical and Commemorative Overland Emigrant Trails, official and unofficial bicycle trails, and off-highway vehicle trails. Stampede Reservoir is just over the ridge, and roads and routes in the Dry Creek project area serve as the main means of access.

Eastside pine is the primary forested vegetation type in the project area. Eastside pine forests are dominated by ponderosa or Jeffrey pine, with lesser amounts of white fir, incense cedar and juniper. Cottonwood and aspen are associated with wet areas. Common shrub species include sagebrush, bitterbrush, snowbrush, and manzanita. Tree regeneration is often difficult due to harsh, dry conditions and growth rates are slow due to short growing seasons. Other characteristics of eastside pine forests include large meadows, abrupt transitions from wet to dry habitats and major vegetation changes due to aspect. The heterogeneous and resilient tree stands that were once common in this forest type where those that naturally combined pockets of large diameter trees with pockets of early seral vegetation. These are now largely replaced with homogenous stands of trees similar in age, species, and genetics. In

general, the current conditions of forest stands in the project area are described below. Determinations of predicted fire intensities are based on modeling in the fire behavior mapping and analysis program FlamMap.

- Approximately 10 percent of the forest stands are in terraced plantations which were created after the 1960 Donner Ridge Fire. These areas experienced the highest intensities during the fire and, subsequently, all dead trees were removed. In order to increase the retention of microsite moisture, the ground was terraced (an experimental method during that time that has shown to only marginally improve conditions) and then planted primarily with Jeffrey pine from an unknown seed source. These areas are highly homogenous in terms of species, genetics, age and structure. Further, the high number of trees per acre is unsustainable and will most likely result in unpredictable and widespread mortality at some point in the near future. These areas also exhibit some of the highest predicted fire intensities under 90th percentile fire weather conditions.
- Approximately another 10 percent of the forest stands also experienced high Donner Ridge Fire intensities, but were not terraced or planted because it was thought a sufficient seed source was available for regeneration. This resulted in some portions of these stands having an abundance of small trees, while other parts remain dominated by brush. Although they may have more genetic, species and structural diversity than plantations, these stands are still comprised of similarly aged trees. Competition between those trees and brush results in limited growth and a low resiliency to any kind of disturbance. These areas, some of which are adjacent to homes, are also shown to exhibit high fire intensities during 90th percentile fire weather conditions.
- Approximately 10 percent of the forest stands experienced mixed Donner Ridge Fire intensities. These stands have the most variability, but after 50+ years of fire suppression since the Donner Ridge Fire, conditions are homogenizing with an abundance of natural regeneration and brush creating unsustainable competition for a limited amount of resources. Although these stands exhibit more predicted mixed severity fire than the younger plantations and stands described above, modeling shows that these areas would exhibit higher fire intensities than what would have occurred had fire been a more active part of stand development.
- Approximately 35 percent of the forest stands analyzed experienced low Donner Ridge Fire intensities or had no effects from the Donner Ridge Fire. Most of these stands have had some fuels reduction work done within the last 20 years. Although this work alleviated some resource stress on the remaining trees and increased the stands fire resiliency, what remains is quite homogenous in terms of genetics, species and structure. This leaves these stands vulnerable to other stand replacing disturbances like a pine beetle outbreak and provides limited habitat diversity for older-forest dependent wildlife.
- Approximately 35 percent of the forest stands were not affected by the Donner Ridge Fire and have had a relatively successful mix of fuel reduction work, variable levels of thinning, and the reintroduction of prescribed fire. This has created conditions that are much closer to what would have developed had active fire been a more natural influence on forest ecosystems. Although these areas don't possess ideal ecological conditions, they are likely to be more resilient to any kind of disturbance while offering more diverse habitat for older-forest dependent wildlife.

The project area is generally outside of the range of natural variability from the historic natural fire regime and from the expected fire return interval. The fire regime current condition class, a qualitative measure describing the degree of departure from historical fire regimes, is predominantly Condition Class 3, in which fire regimes have been significantly altered from their historical range.

Specific Human Activities

The larger project area has seen extensive use by Native American people prior to the Euro-American immigration. There are numerous locations that represent food procurement and food processing activities (i.e., projectile points, milling equipment), production activities (i.e., quarrying) and point to sacred or religious activities such as rock art. The area is within the territory of the Washoe, or more specifically, the group of Washoe that identified themselves as the ***Wel mel ti,*** or the northerners. The Washoe Tribe of Nevada and California is a Federally recognized tribe.

The dense road and trail network now found in the Dry Creek project area was initiated in 1844 with the Overland Emigrant Trail (OET). With the expanding western frontier and the discovery of gold in California, the OET guided thousands from the desert into the Sierra Nevada Mountains and California. While the OET initiated the area as a major route for travel, it eventually fostered a new local economy pivoting on logging and trade. With a vast untapped forest, and developing road system and infrastructure, the area was well positioned to supply emerging needs for the Comstock Lode silver mining bonanza that started in 1859. The Comstock silver lode of Virginia City, Nevada created an enormous demand for lumber used for mining shafts, buildings, fuel, and railroad ties. Early in the Comstock boom, land in the region, including the Dry Creek project area, was increasingly purchased for timber extraction and supplies (including food supplies from ranching and farming), and the road system of the area was more extensively developed. Extensive roads were critical to the economy of the era.

Early logging companies extracted timber and used the road and waterway system from the mid-1860s through the 1930s. Sierra Nevada Wood and Lumber Company (SNW&LC) and Hobart Mills Estate became a major timber extractor in the Dry Creek watershed from 1896 through the 1930s. Richards (2012) states, “This was industrial logging and lumber production on an immense scale…”. An extensive railroad system was developed to support this logging. The USDA Forest Service purchased lands from the SNW&LC and Hobart Mills Estate after the mill closed in 1936.

By the end of the settlement era, after nearly 50 years of aggressive logging and land use, the flat and gently-sloped areas of the Dry Creek watershed were nearly tree-free, and new linear features, such as roads, skid trails and railroad grades, marked the ground. Largely under federal ownership after 1936, most lands capable of supporting trees or timber in the Dry Creek watershed area were minimally managed until 1960.

A growing population in Reno and the region led to the need for intensive management of waterflow in the Truckee and Little Truckee Rivers. To meet demands, the Bureau of Reclamation began management of Boca Reservoir in 1937. Dry Creek flows into the northwest arm of Boca Reservoir and the Little Truckee River flows into the northeast arm of Boca Reservoir. The Little Truckee River flows out of the reservoir before merging with the mainstem Truckee River. The fluctuating water levels within Boca

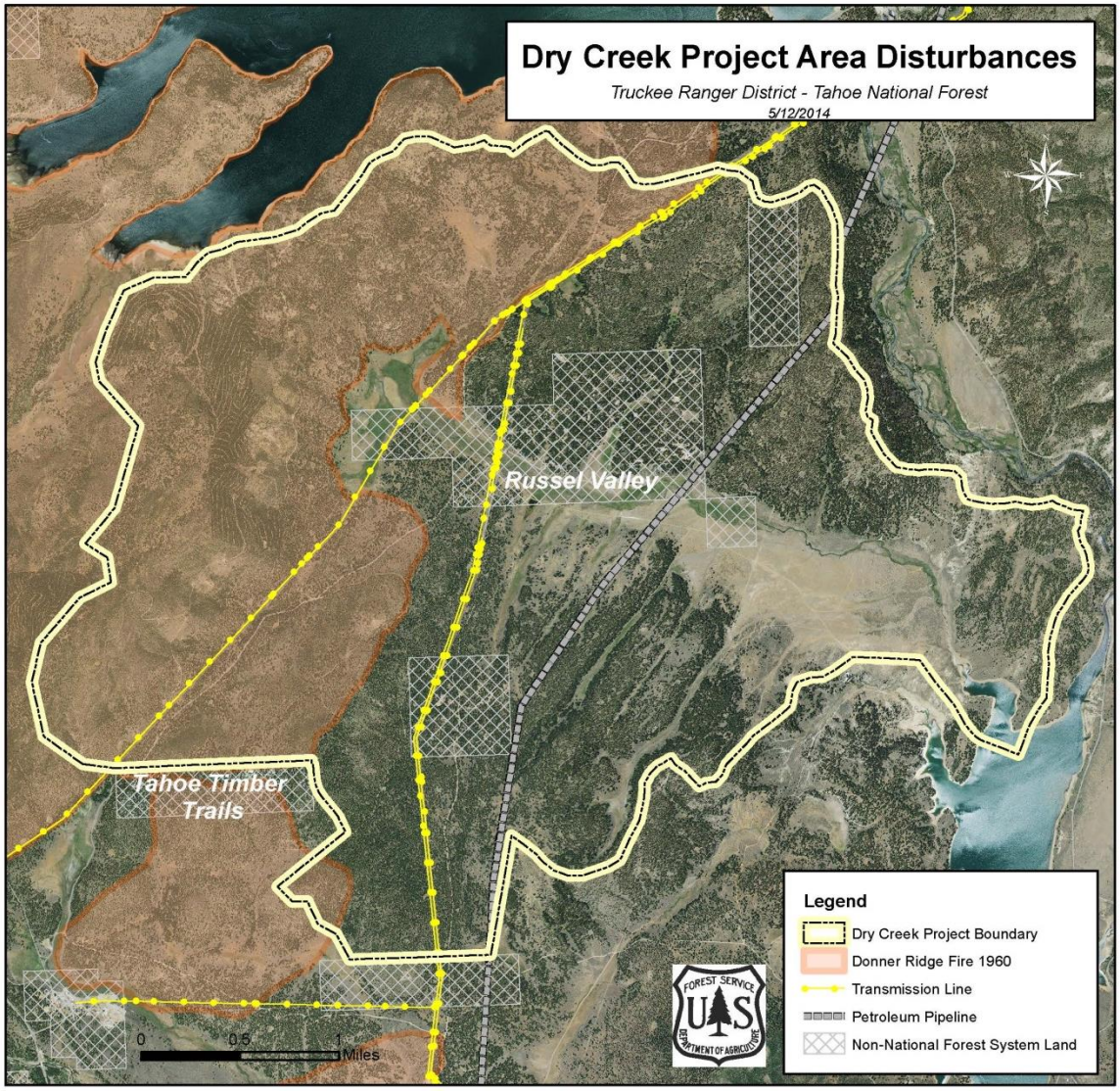
Reservoir have caused destabilization of Dry Creek as it enters the reservoir and has initiated a head cut that is now migrating upstream.

In 1960, major portions of the watershed and surrounding area were affected by the Donner Ridge Fire. The fire, as well as the timber salvage and site preparation activities that followed, contributed to stream channel degradation and soil erosion. In the aftermath of the 1960 Donner Ridge Fire, one of the major concerns was soil erosion on the steeper slopes. The fire burned with intense heat through some areas, completely stripping the land of all soil holding vegetation. At that time, one of the few known tools to combat erosion was terracing. Generally, terracing was done on slopes in excess of 35 percent using dozers equipped with a blade. The terraces were built by contouring the hill with the blade down in order to level the ground in a bench type fashion. Unfortunately this scraped off much of the surface soil horizons and discarded them as side cast. Trees were then planted on these flatter surfaces. This resulted in varying degrees of success and failure. In some cases, plantations completely failed, or the trees were stunted, likely because they were planted on sites scraped of surface soil. The plantations on terraces in the Dry Creek project area were largely successful, although they are currently overstocked for the available resources.

Beginning in the 1990s, some vegetation management projects have been implemented. All of the projects have generally been small in scale and were designed to implement underburning, manage the plantations with pre-commercial thinning, thin stands of trees for hazardous fuels removal needs, to implement salvage of trees killed by insect activity, and improve early seral habitat for wildlife with the creation of small openings.

The Truckee area is a nationally known resort and recreation destination. People are drawn to this area because of the recreational opportunities, mountain environment, and scenic beauty. The terrain between Boca and Stampede Reservoirs and the community of Truckee is a popular area for recreational activities. Commercial and residential development began to increase in the late 1960s and continues today. Homes now exist in the privately-owned parcels within the project area, and recreational activities such as hiking, mountain biking, off-highway vehicle use and horse riding radiate into the wildlands of this area. Because of increased local and regional residential and commercial development since the 1960s, power lines, pipelines and fiber-optic lines have also been constructed in the Dry Creek watershed area. All of these actions and disturbances combined have contributed to an altered landscape in the Dry Creek project area.

Figure 2: Dry Creek Watershed Area Disturbances



Need for the Dry Creek Project

This section describes why the Forest Service is proposing to take actions now in the Dry Creek project area to:

- create heterogeneous forest stand conditions that would be expected to develop under an active fire regime and that would improve forest resiliency;
- improve watershed conditions;
- enhance the ecological role of fire;
- maintain and enhance habitat for the northern goshawk;
- reduce hazardous fuel loadings and modify wildland fire behavior;
- restore declining aspen stands within unit boundaries, and
- manage recreation features, utility corridors, and private land boundaries.

Creating heterogeneous forest stand conditions that would be expected to develop under an active fire regime and that would improve forest resiliency

The heterogeneous and resilient forested stands that were once common in eastside pine forest types in the Dry Creek area, are now largely replaced with homogenous tree stands of similar ages, species and genetics. Stands present in the area prior to Comstock era logging developed with active fire creating a forest structure composed of pockets of large diameter trees with pockets of early seral vegetation intermixed. A variety of tree species, age classes, and seral stages were represented. Due to this variability, these stands were resilient to disturbances such as wildland fire and insect/disease attack. The transition to homogeneous stands occurred as a result of the large scale Comstock era logging followed by subsequent regeneration. This was further compounded having been left with very few trees that could act as viable seed sources for regeneration. Additionally, fire suppression prevented stand conditions from forming that would be more typical of eastside pine forests. The fire suppressed stands lacked pockets of different seral stages. In 1960, the Donner Ridge Fire and its associated salvage and regeneration management did affect stands on a large scale and did increase heterogeneity at a large scale. However, that scale was beyond the stand- and site-level heterogeneity that would have developed with active fire conditions. Recently some fuel reduction efforts, in areas not influenced by the Donner Ridge Fire, have created some heterogeneity between stands of trees, however a significant portion of the project area is still homogeneous in nature. The planted and regenerated Donner Ridge Fire stands and other stands that have developed post Comstock era logging do represent different age classes and stand structure, however as a whole are very homogeneous within their types. There is an abrupt change between the two types of stands. It is understood that such abrupt changes are not consistent with the scale and type of variability that would have existed had fire been more active.

A range of vegetation condition scenarios exists in the Dry Creek project area that would benefit from some type of treatment which would increase heterogeneity and therefore resiliency, as suggested in recent studies by North et al. (2009 and 2010) and others. The current conditions in tree stands have made them vulnerable to a host of mortality factors including drought stress, beetle outbreaks, disease, and the over-arching ramifications of climate change. Excessive tree mortality can have significant and long-term effects on forest structure and composition, and these conditions can exacerbate the threat of severe fire. Action is needed to develop forest stands that can be more resilient to this array of threats. Enhancing forest heterogeneity at both the stand- and landscape-scale; reducing stand densities in certain locations; and modifying tree species composition, for example, favoring more fire resilient pines on south facing slopes, could address these potential sources of mortality. Reducing stand densities would result in less competition for resources such as soil moisture and light, which would help accelerate the development of stands comprised of larger trees. By creating a more heterogeneous landscape, remaining trees and stands would be better able to cope with drought stress, insect infestation, and disease outbreaks. Climate change is anticipated to aggravate these stressors; hence, action is needed to enable stands in the Dry Creek project area to be more resilient under expected future conditions.

Improving watershed conditions

The Dry Creek Watershed Assessment (USDA 2013) identified how past actions, many of which are human impacts, have affected the natural hydrology of the watershed and surrounding area. Soils have been compacted and in some cases, scraped away, which decreases water infiltration and changes water flow. The road and skid trail network and historic railroad grades have caused flows to be interrupted, captured, and, in some cases, moved to the surface when they should have been subsurface. Road, skid trails, and other direct impacts (such as reservoir management) have caused the meadows to erode and incise. Incision of the channel through the meadows has caused loss of floodplain connectivity, loss of filtering capacity, lowering of the seasonal water table, and loss of riparian and aquatic habitat. It also reduces water holding capacity, increases sediment movement to the streams, and increases the speed of water draining from these areas. Some of the stream segments have active head cuts that need to be stabilized to slow or stop the erosion from moving upstream. More recently, pipeline and power line construction, and user-created routes have contributed to modified linear drainage networks, also accelerating erosion and speed of water draining.

The Dry Creek watershed and surrounding areas had relatively low to moderate rates of erosion prior to human disturbance. Without human disturbance, the area would be expected to have low to moderate rates of erosion. The topography and drainage system are mainly on a low to moderate gradient with a small potential for unstable vegetated conditions.

Identified impacts have decreased the ability of the watershed to capture and store water, have increased the speed at which water drains from the watershed, have increased erosion and sediment transport, and have reduced riparian and aquatic habitat. The Truckee River and all of its tributaries have been listed as an impaired waterbody (303(d)) within the Clean Water Act for high amounts of sediment. The Dry Creek Watershed is a tributary to the Little Truckee River via Boca Reservoir and flows into the Truckee River. Watershed conditions need to be improved to reduce erosion, improve water holding capacity, and improve habitat.

Enhancing the ecological role of fire

Fire plays a pivotal role in reshaping and maintaining forest ecosystems. Action is needed to jumpstart ecosystem processes that have been stalled by accumulating surface fuels and the absence of frequent burning (North 2006). Data collected by the California Fire Return Interval Departure (FRID) map project in 2011 compiled information about fire return intervals for major vegetation types on the 18 National Forests in California and adjacent land jurisdictions. Comparisons were made between pre-Euro-American settlement and contemporary fire return intervals (FRIs). The five historical natural fire regimes are classified based on the average number of years between fires (fire frequency) and combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. Based on the FRID map project findings, the Dry Creek project area is a historic natural fire regime I, with a scattering of II

Figure 3: Historical Natural Fire Regimes

Historical Natural Fire Regimes:

I: *0–35-year frequency, low severity, active fire regime*

II*: 0–35-year frequency, stand-replacement severity*

III*: 35–100+ year frequency, mixed severity*

IV: *35–100+ year frequency, stand-replacement severity*

V*: 200+ year frequency, stand-replacement severity, inactive fire regime*

and IV. This area naturally had an active fire regime with low severity fires occurring every 0-35 years; however currently the FRI is 53-103 years or longer (fire regime III), which is a substantial departure from the natural FRI over the larger project area.

Fire adapted ecosystems, like the Dry Creek project area, need fire as an active ecosystem process in order to improve or maintain fire resilient attributes. Low intensity surface fire would achieve many objectives intended for fire resilient forests, such as reducing surface and ladder fuels, increasing canopy base height (pruning lower limbs), and increasing the proportion of fire resistant tree species. A long-term goal is to return more frequent and low, with some mixed, intensity fire to this area. This cannot be achieved without some initial management action to reduce the excessive fuel loading that currently exists in portions of the project area.

Maintaining and enhancing habitat for the northern goshawk

The Dry Creek project area currently provides some habitat for the Forest Service designated sensitive species northern goshawk (*Accipiter gentilis*). The area contains two goshawk designated protected activity centers (PACs) of approximately 200 acres each. The purpose of these areas is to provide suitable nesting and foraging habitat for this species. However, surveys in recent years have not detected any goshawks using these areas. There are several opportunities to enhance microsite and stand conditions for nesting, post-fledging, and foraging activities next to PACs and within the larger project area. Nest sites are generally comprised of larger trees with a denser canopy. Emphasis should be placed on creating or maintaining vegetative diversity, increasing overall basal area in large trees, retaining stands of mature timber, and retaining mature timber around permanent water sources and along forest-open edges. Post-fledging areas surround the nest area(s) and are used by both adults and the young as they learn to hunt from the time of fledging through dispersal. Post-fledging habitat generally consists of a variety of forest conditions that provide for a diverse prey base for goshawk foraging as well as pockets with higher amounts of cover for roosting and protection.

A landscape configuration of areas of high value habitats (such as post-fledging, foraging, and nesting habitats), combined with other habitat types (such as more open areas that may provide habitat for prey species), is critical in maintaining and enhancing habitat conditions capable of supporting goshawks and other wildlife species that rely on older forest habitats. Action is needed to improve habitats by increasing heterogeneity and resiliency while enhancing, microsite, stand, and landscape habitat conditions by (1) retaining and/or enhancing high value habitat for goshawk; (2) retaining and recruiting large trees and crown cover; (3) retaining and recruiting areas called dense cover areas (DCAs) that currently have dense, multilayered tree and vegetation conditions; (4) retaining and recruiting areas called early seral openings (ESOs) that provide early seral conditions suitable for prey species; (5) retaining and recruiting trees with decay and/or “defect” structures to support cavity development or platforms for nesting sites; and (6) retaining and recruiting large and small dead wood features such as snags and down logs in various configurations which will help support a diverse prey base.

Reducing hazardous fuel loadings and modifying wildland fire behavior

A large wildfire in the Dry Creek project area would likely have severe adverse effects on natural and cultural resources as well as human property and life. Large, uncharacteristically severe wildfires have

occurred in and around the Dry Creek project area in the past, most notably the 1960 Donner Ridge Fire, which burned a total of approximately 44,000 acres by primarily high fire intensities. As the Donner Ridge Fire moved northeast to end in the Dry Creek region, it decreased in severity, leaving a mosaic of mixed and high severity effects. Because the human population of the area was sparse at the time, it resulted in minimal loss of property.

With the exception of the areas affected by the 1960 Donner Ridge Fire, which burned approximately 20 percent of the area under high and mixed fire intensities, the majority of the Dry Creek project area has not burned for decades. The accumulation of forest fuels over time has created the potential for a large, severe wildland fire in the Dry Creek project area. The increased tree density, fuel loads, and stand homogeneity due to fire suppression and past management practices have increased the likelihood of uncharacteristic extensive crown fires. Currently, moderate surface fuels (10 to 20+ tons per acre) coupled with moderate ingrowth of shade-tolerant sapling size trees provide a continuous fuel bed. Crown fire and some passive crown fire would be expected in this area under 90th percentile weather conditions. The area overall is considerably outside of the range of natural variability from the natural fire regime and from the expected fire return interval.

There is substantial risk that a wildfire could start in any of the highly populated or recreated areas near or within the Dry Creek area during a period of low fuel moistures. Under such a scenario, the fire entering the project area would likely be characterized by extreme fire behavior, with high flame lengths and high rates of spread. Such a fire would be expected to spread in a manner similar to the historic Donner Ridge Fire or other more recent large fires in the Truckee/Tahoe area. There is also the possibility of a fuel-driven wildfire from the southwest in which fire would move through the even-aged plantations in the western portion of the project area. The high vegetation densities in these plantations, combined with the short distance from the ground to the live crowns of the trees, would cause the fire to spread rapidly. A secondary threat is a wildfire starting along the south shore of Stampede Reservoir, which could be driven into the area by winds from the north/northeast.

A rapidly spreading wildfire in the Dry Creek project area would be a significant risk to human life and property. There is an entire community known as Russel Valley located within the project area and another seasonal community known as Tahoe Timber Trails bordering the southern boundary of the project area. A wildfire would also threaten major infrastructure such as electrical transmission lines. Furthermore, it would adversely affect numerous ecological values, including older forest habitat for the northern goshawk as well as more sensitive or limiting habitats, including riparian habitat, aspen stands, and meadows. A severe wildland fire could have substantial adverse effects on water quality in Dry Creek and its tributaries, the waters of which enter the Little Truckee and Truckee Rivers. The State of California has listed the Truckee River as being “water quality limited” under Section 303 (d) of the Clean Water Act. Finally, the area contains a substantial number of cultural resource sites, many of which could be negatively affected by a wildland fire.

Restoring declining aspen stands within unit boundaries

Due to fire exclusion and plantation management, some aspen stands in the Dry Creek project area have been overtopped by conifers and/or need a disruptive agent to stimulate aspen regeneration. These

stands have a higher percentage of conifers compared to aspen and/or have very little regeneration of aspens due to over-shading or a lack of fire. Aspen habitat is particularly important for biological diversity and is limited across the landscape. Actions to restore aspen stands within unit boundaries would help to enhance and perpetuate these highly diverse habitats over the long term.

Managing recreation features, utility corridors, and private land boundaries

By addressing the above needs, other opportunities to manage conditions adjacent to recreation (trail) features, electrical corridors, and private land boundaries where those areas overlap potential treatment areas were also identified. The Commemorative Overland Emigrant Trail (COET) is one of the most accessible and popular trails on the Truckee Ranger District. It is a non-motorized trail that gets heavy use from day hikers and mountain bikers. It is also one of the eastern most designated trails on the district and therefore gets the earliest and latest use in a given year. Since the trail traverses many slopes and drainages, conditions on the trail can be widely diverse. Early in the year, the south facing slopes can be clear while the drainage bottoms can be snow covered and impassible, versus late in the year, the south facing slopes can be very hot and dusty when the north facing slopes and drainage bottoms are shaded and cool. In the early season, users, thinking the trail is free of snow, are then forced to trek through the snow or maneuver off trail in drainages or on north facing slopes. Not only does this interrupt the user experience, it can also increase erosion and sedimentation into nearby streams. Treatments such as light thinning to allow more solar exposure to facilitate an earlier snow melt would reduce user-caused erosion or resource damage. On south facing slopes, later in the season, drier, hotter, and dustier trail conditions can be present. In order to improve summer shading on the COET, more crown cover needs to exist close to the trail. There is a need to manage an approximate 50 foot zone on either side of the COET to improve trail conditions.

Where utility corridors overlap potential treatment areas, opportunities exist to manage vegetation in and adjacent to powerline right-of-ways. Hazard trees (defined using Forest Health Protection Report # RO-12-01, *Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region*, Angwin et al. 2012) are a potential risk to powerline safety and integrity. There is also a risk that a wildland fire could start from powerlines being knocked down by trees or wind. In addition, the powerlines could be at risk from a wildland fire from the adjacent forest. Opportunities exist to proactively assess for potential hazards and to treat potential fuels. There is a need to manage vegetation along these utility corridors to maintain appropriate clearances and manage hazards.

Private land within the Dry Creek project area is largely occupied by commercial and residential development, with many homes located in close proximity to NFS lands. Wildland fire poses a risk to human life and property especially in these areas. This zone directly adjacent to private land boundaries is an important focused zone in terms of reducing fuel and minimizing fire behavior because of its strategic location. In this zone, it is important to produce and maintain conditions that will support only ground fire, even under more severe fire conditions than what we might manage for in other areas. There is a need to focus the most intense fuels reduction activities in the approximate 200 foot wide zone adjacent to private land boundaries.

Purpose of the Dry Creek Project

The primary purpose of the Dry Creek Project is to address some of the recommended improvements and opportunities for watershed/road improvements and forest ecosystem (ecological) restoration put forth in the Dry Creek Watershed Assessment (USDA 2013). In order to plan for ecological restoration however, other purposes of the project are to:

- Integrate and build upon lessons learned from the Sagehen Project collaborative effort.
- To use information and concepts put forth in General Technical Report (GTR) – 220, *An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests* (North et al. 2009, North et al. 2010); specifically the concepts using topographic variables (Underwood et al. 2010) (i.e., slope shape, aspect, and slope position) as a guide for varying treatments for enhancing forest resiliency, increasing stand and landscape scale heterogeneity, and restoring the ecological role of fire to the landscape, while maintaining habitat for sensitive wildlife species.
- To use tools, examples, concepts, and information put forth in GTR-237, *Managing Sierra Nevada Forests* (North 2013); which also built upon the GTR-220 concepts. Methods for assessing forest heterogeneity at the stand level using the Forest Vegetation Simulator (FVS) and a new geographic information system (GIS) tool for project level planning that classifies a landscape into different topographic categories were both used.

By addressing the above purposes, other opportunities for species specific management goals and special habitat feature management (e.g. aspen stands) were also identified. By classifying the landscape into different topographic categories, the project also provides opportunities to manage conditions adjacent to recreation (trail) features, electrical corridors, and private land boundaries.

The purpose of the project is consistent with the Tahoe National Forest Land and Resource Management Plan (LRMP) (USDA 1990), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD) (USDA 2004), when combined are referred to as the Forest Plan. This plan provides direction for the management of old-forest associated species, fire and fuels, and aquatic, riparian, and meadow ecosystems. It guides projects to protect, increase, and perpetuate desired conditions of old-forest ecosystems, to increase the frequency of large trees, and to increase structural diversity while reducing hazardous fuels to reduce the threats to communities and wildlife habitats. It also guides projects to reduce erosion and maintain and restore the hydrologic connectivity of streams meadows, wetlands and other special aquatic features by implementing corrective and restorative actions.

Wildland urban interface (WUI) defense zones surround the immediate vicinities of the private land in the project area, primarily around the communities of Russel Valley and Tahoe Timber Trails, but also other residentially developed private land. These defense zones are buffered by WUI threat zones. The entire project area is comprised of WUI defense and WUI threat zones. Overlapping these land allocations are two northern goshawk protected activity centers (PACs). The proposal for the Dry Creek Project is consistent with Forest Plan desired conditions, management intents, and management objectives for these land allocations. Proposed activities would adhere to Forest Plan standards and guidelines.

Proposed Action

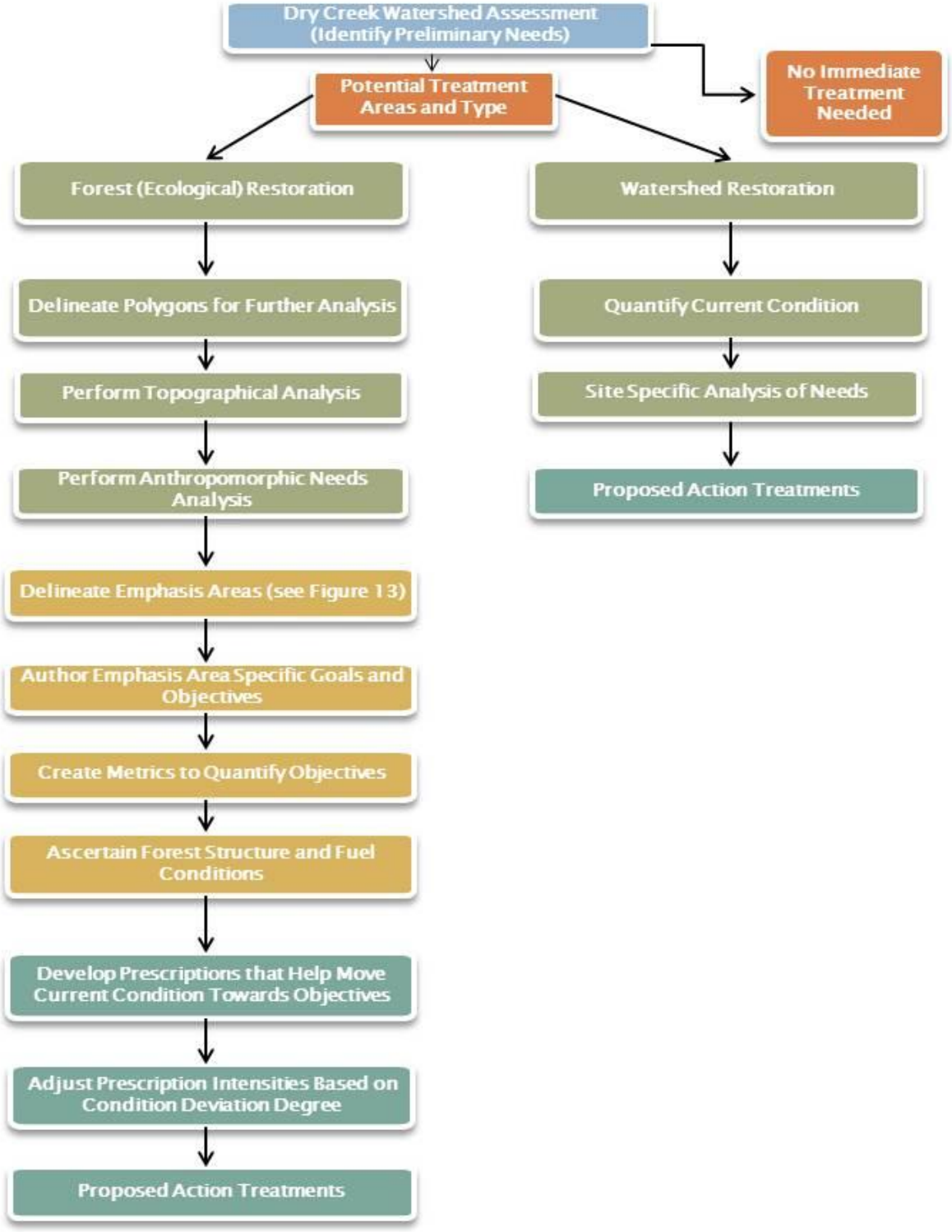
How the Proposed Action was Developed

As stated above, the Dry Creek Project was initiated based on information presented in the Dry Creek Watershed Assessment (USDA 2013b). This watershed assessment was conducted to provide an overview of the current condition of the watershed in the light of past activities and impacts and to identify opportunities for restoration actions. A formal definition of ecological restoration is "The process of assisting the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions"(USDA Forest Service Manual 2020.5). For watershed improvement and restoration actions, very site-specific assessments were made that identified actions that would reduce erosion and improve hydrologic connectivity and function. For forest (ecological) restoration, current condition information was considered in light of findings and concepts presented in GTRs 220 and 237 (North et al. 2009, North et al. 2010, North 2012), and from lessons learned and collaboration from the Sagehen Project (USDA 2013a).

First, a key piece of proposed action development, is all actions considered are based entirely on a consideration of the current conditions, then the development of goals and desired objectives, and lastly, site-specific designs that direct how to move the current condition towards desired objectives. No actions are proposed that do not assist in the achievement of desired future objectives.

A general flowchart of how the proposed action was developed is depicted below.

Figure 4: Proposed Action Development Flowchart



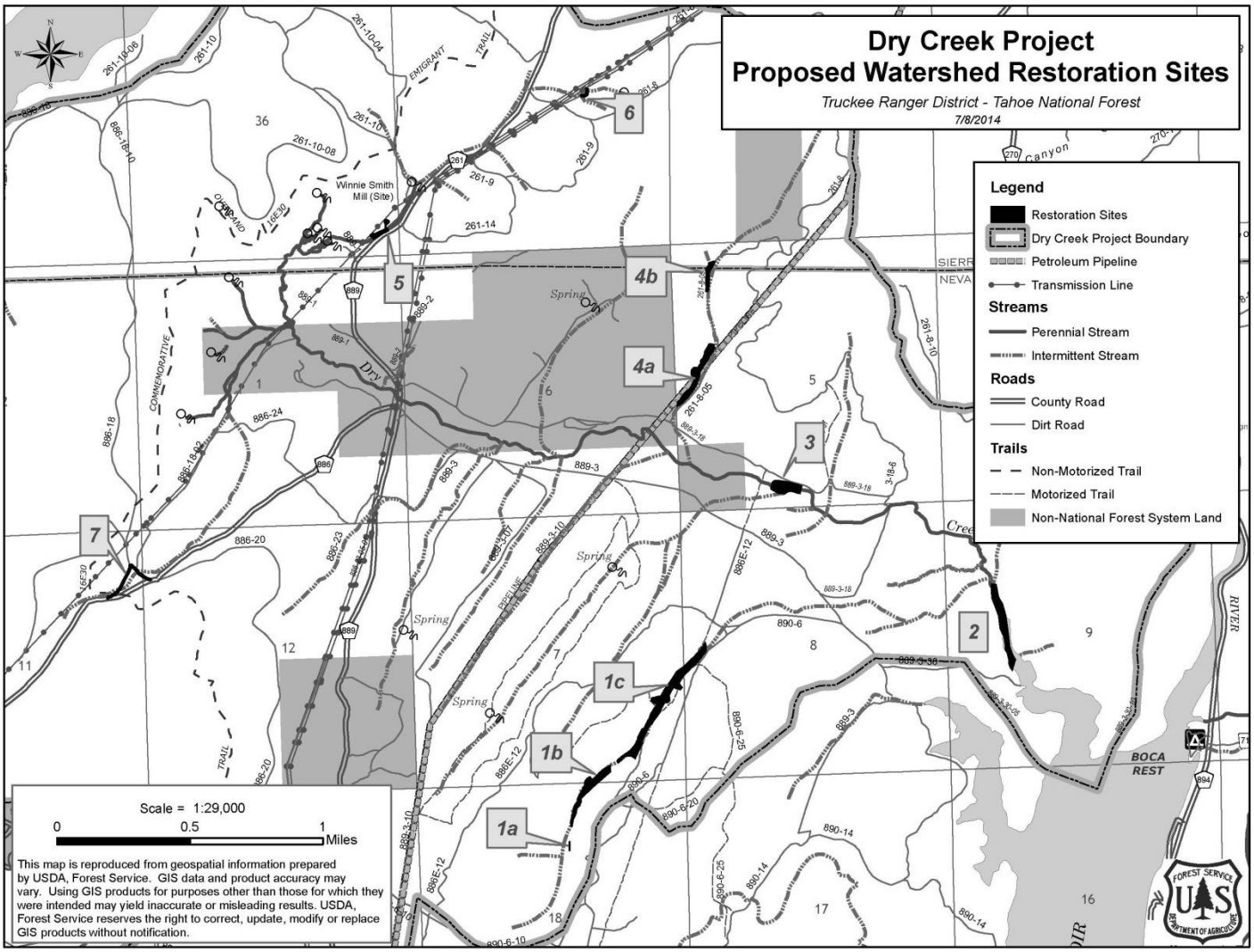
How the Proposed Action is Organized

The Proposed Action is organized into two main sections: **1) watershed restoration proposed actions including road work to reduce erosion** and **2) forest (ecological) restoration proposed actions** which include emphasis areas, prescriptions, treatment methods, and metrics.

Site-Specific Watershed Restoration

As identified in the Dry Creek Watershed Assessment (USDA 2013b), there are a number of opportunities to reduce erosion and to improve/re-establish hydrologic connectivity. Specific actions are described below. For all proposed actions, sites with ground disturbance would be re-seeded with seed mixes collected on-site prior to project implementation. In addition, where soil is needed for specific actions, topsoil and associated vegetation would be reserved for post-project replacement and rehabilitation.

Figure 5: Proposed Watershed Restoration Sites



Site 1

The middle portion of this intermittent tributary to Dry Creek has become incised; the water no longer flows in the remnant historic channel and it doesn't interact with the entire drainage floodplain. There are numerous headcuts and cutbanks along the length of the tributary (sites 1b, 1c – see map above). In addition, the lower part of the drainage is affected by the road/trail system (site 1c). The proposed treatment is to restore natural hydrologic function of the valley bottom by bringing the drainage up to grade and partially eliminating the gully to stabilize headcuts. This would raise the seasonal water table and expand riparian meadow vegetation (sites 1b, 1c). Soil and rock to eliminate the gully would be gathered from alluvial fans/deposits on the edges of the meadow system along the bases of hill slopes.

In addition, some damage to the meadow has occurred from unauthorized off-highway vehicle (OHV) use. Part of the proposal is to rehabilitate ruts from tire tracks in the meadow and to implement preventative measures to minimize vehicle access in the meadow system (site 1a). A non-system road that dead-ends into the head of the meadow would be obliterated so users would not be directed into the meadow. The designated OHV trail that crosses the lower portion of the tributary would remain, but would be redesigned, hardened, and raised, with signing and directional markers or structures within 50 feet on each side of the crossing to discourage use off the designated trail.

Overall, approximately 8,700 yards of soil/rocks over 1.8 acres would be needed to stabilize headcuts and to partially eliminate the gully to reconnect the channel. The area proposed for restoration is approximately 14.2 acres spread out in three sites, along a 4,920 foot section of channel.

Figure 6: Site 1 (1) Headcuts and (2) Incised Channel

Site 2

At Site 2, where the main stem of Dry Creek enters Boca Reservoir, the fluctuating water levels associated with the reservoir pool have caused this portion of Dry Creek to destabilize. This has caused the stream to actively head cut up valley and erode laterally. Proposed restoration would be accomplished by stabilizing the channel with rock riffle work and building step pools to allow fish passage. Approximately 75 yards of rocks would be needed to stabilize the headcut and create the step pools. The area proposed for restoration is approximately 5.6 acres along a 150 foot long and 45 foot wide section of channel.

Figure 7: Site 2 (1) Erosion of Channel and (2) Headcut where enters Reservoir

Site 3

There is a large headcut in the middle of the valley on the main stem of Dry Creek which is eroding and moving slowly up valley. It has also begun to branch and begin headcuts on small drainages entering the main stem. The entire headcut complex would be stabilized by partially eliminating the gully, by adding rock riffle, and building step pools. This would restore the natural hydrologic function, would raise the seasonal water table, and expand riparian meadow vegetation in the area. Approximately 75 yards of rocks would be needed to stabilize the headcut and create the step pools, and approximately 1,500 yards of soil/rocks would be needed to fill the gully. The area proposed for restoration is approximately three acres along a 625 foot section of the main channel

Figure 8: Site 3 (1) Large Headcut and (2) Gully downstream from Headcut

Site 4

A tributary to Dry Creek was affected when a buried pipeline was constructed diagonally bisecting the dry meadow and intermittent stream channel. The pipeline access road runs adjacent to the meadow, disconnecting subsurface and surface flows to the meadow. Stream flows have been diverted and have created an erosion gully where the stream now runs rather than in the remnant channel (site 4a – see map above). In addition, there are other segments of road that cross the intermittent channel and have further diverted flows from the natural channel and incised the gully (site 4b). There are numerous small headcuts where the channel deviates from its normal course. The proposed action in these areas is to eliminate the gullies that have eroded and re-grade the slope to reconnect the original stream course.

Rock anchoring work would be placed in the lower end where the stream would reconnect with existing channel. Where the road runs through the flood plain (site 4b), it would be decommissioned and relocated further up slope. Approximately 2,904 yards of soil/rocks from approximately 0.6 acres would be needed to stabilize the headcuts and eliminate the gullies. The road decommission would total 647 feet of road. The area proposed for restoration is approximately 5.5 acres along a 2,430 foot section of channel.

Figure 9: Site 4 (1) Gully Downstream from Pipeline and (2) Road/Floodplain with Gully

Site 5

There is an active headcut moving upstream/up valley along an intermittent tributary that parallels county road 889/261. This headcut has formed a gully outside of the remnant channel with an eroded stream bed and bank. The actively eroding area is beginning to enter a meadow system. Proposed watershed restoration at this site includes treatment of the headcut and the area downstream with a combination of rock riffles and soil to stabilize and reconnect the natural hydrology of the area. Approximately 968 yards of soil/rocks from approximately 0.2 acres would be needed to stabilize the headcut and reconnect the channel. The area proposed for restoration is approximately 1.1 acres along a 400 foot section of channel.

Figure 10: Site 5 (1) Headcut Moving into Meadow and (2) Gully Downstream of Headcut

Site 6

There is a small segment of FSR 261-8-4 that runs directly in an ephemeral stream channel causing active erosion. This segment of road would be realigned outside of the channel and proper drainage and

erosion control measures would be installed. The segment of road in the drainage would be obliterated and rehabilitated so that the natural hydrology of the channel is restored. The road obliteration would rehabilitate 173 feet of stream channel by removing the road. An approximate 230 foot segment of road realignment would be constructed outside of the drainage and approximately 0.4 acres would be restored.

Figure 11: Site 6 (1) Ephemeral Channel Intersect with Road and (2) Looking Upstream from Road

Site 7

Forest System Road (FSR) 886-18 connects with county road 886 at two separate locations; as road 886-18 nears road 886, it splits and two intersections are formed approximately 1/8 mile apart on road 886. The more northern spur of FSR 886-18 is actually an old railroad grade which crosses an intermittent channel and associated meadow. This spur is redundant to the use of FSR 886-18 and is channeling water in the meadow and a gully has formed (note culvert location in railroad grade/road in pictures below). This redundant spur of FSR 886-18 would be obliterated and the fill that was added to the meadow with the railroad grade would be removed. At the southern intersection with road 886, this section of FSR 886-18 would be improved over approximately 823 feet. Approximately 482 feet of road/railroad grade would be obliterated and removed from the meadow. The area proposed for restoration is approximately two acres.

Figure 12: Site 7 (1) View of Railroad Grade and (2) Culvert and Gully in Meadow

Forest (Ecological) Restoration

For the Dry Creek Project, the concept of stand level ecological restoration focuses on creating a heterogeneous forest stand that would be representative of a forest stand under a more active fire regime. Therefore, it would be expected that forest stand species mixes, structures, and densities would vary dependent upon topographic variables, such as slope aspect and position. One of the key principles in both GTR-220 and GTR-237, the concept of topographic variability as a determining factor in forest composition and structure, was used in combination with other key sources of spatially explicit information (e.g. locations of northern goshawk PACs, private land boundaries, powerline corridors, recreation trails, etc.) to partition the landscape into subunits which were termed as emphasis areas. Goals and objectives were then developed for each emphasis area type. By partitioning the landscape, objectives could be specifically tied to existing and potential conditions that explicitly address landscape heterogeneity and/or habitat quality. Based on these objectives, tailored silvicultural and fuels management strategies were crafted to meet the needs for each of the emphasis areas considering the primary objectives for each area.

Areas Identified as Emphasis Areas

Overall Goals and Treatment Objectives

For the majority of the emphasis areas, there are four primary objectives, albeit in different orders of priority depending on the emphasis area. These primary objectives include: a) Creating site scale, stand scale and landscape scale heterogeneous forest conditions that would be expected to develop with active fire; b) Enhancing the ecological role of fire; c) Maintaining and enhancing northern goshawk habitat that would be expected to develop with active fire; and d) Reducing hazardous fuel loadings in order to modify wildland fire behavior. For emphasis areas that were designated with a more narrow purpose, other primary objectives were assigned, such as: a) Improving conditions for aspen stand growth and expansion; b) Powerline safety improvement, and c) Maintaining and enhancing recreation experiences.

For all emphasis areas, a common set of metrics were identified to assess different post-treatment stand conditions, which would reflect the primary treatment objectives of that area. The metrics used include: a) basal area retention, especially in trees greater than 20 inches diameter at breast height (dbh); b) predicted mortality; c) canopy cover/canopy closure; d) snag density; e) large and small down woody material; f) tree species composition; g) dense cover areas (DCAs) with multiple tree ages; h) early seral openings (ESOs); i) large, isolated tree population; and j) fire behavior modeled values under 90th percentile weather conditions, including flame lengths and predicted crown fire and associated larger tree mortality.

While it is preferred that prescribed and natural fire become two primary management tools over the long term in all the emphasis areas, interim steps are needed so that fuels may be reduced to a more natural level, allowing fire to occur as it would have if fuels had not built up to unnatural levels. In order to facilitate that, near term management goals include the use of silvicultural and/or fire/fuels prescriptions and treatment methods that can, to a certain extent, mimic some of the effects of natural fire. Once these treatments have been applied it is hoped that prescribed or natural fire could occur

without heavy mortality and uncharacteristically severe effects. These prescriptions and treatment methods and how they apply to emphasis areas (subunits), are detailed in the sections below beginning with "Prescriptions and Treatments". Directly below are sections that explain the overall goals and treatment objectives for each emphasis area.

How Emphasis Areas are Shown on the Map

Each emphasis area (listed below in Table 1) is represented by a different color/pattern in Figure 13 below. These colors/patterns translate into subunits within the proposed treatment unit boundaries. For example, in treatment unit 25, the two discontinuous orange areas are both Forest Restoration Emphasis Area - south/southwest facing slope (SWF) and they are both designated subunit 25-SWF. In another example, treatment unit 55 is comprised of three emphasis areas: Forest Restoration Emphasis Area - north/northeast facing slope (NEF) (dark gray), Forest Restoration Emphasis Area - south/southwest facing slope (SWF) (orange), and Forest Restoration Emphasis Area - ridge tops (RIF) (yellow). It therefore has subunits 55-NEF, 55-SWF, and 55-RIF. Unit 39 is comprised only of Forest Restoration Emphasis Area - aspen (ASF) (purple), and therefore is designated 39-ASF.

Table 1: Emphasis Areas

Emphasis Area Shortname	Emphasis Area Name	Emphasis Area Location	Total Acres in Emphasis Area
DRF	Forest Restoration Emphasis Area - drainage bottoms	Stream courses and other mesic (moderate moisture) canyon bottoms, a defined channel may or may not be present.	260.4
NEF	Forest Restoration Emphasis Area - north/northeast facing slope	Forested stands located on north/northeast facing slopes, can include natural and plantation stands	915.3
SWF	Forest Restoration Emphasis Area - south/southwest facing slope	Forested stands located on south/southwest facing slopes, can include natural and plantation stands	533.6
RIF	Forest Restoration Emphasis Area - ridge top	Forested stands located on ridges, can include natural and plantation stands	416.6
ASF	Forest Restoration Emphasis Area - aspen	Aspen stands at risk in or near forest restoration treatment areas	21.8
LTG	Forest Restoration Emphasis Area - legacy tree grove	Two small isolated groves of large legacy trees within units 26 and 74	11.1
DRR	Recreation Emphasis Area – drainage bottoms	Where the Commemorative Overland Emigrant Trail (COET) passes through emphasis area DRF; 50 foot zone on each side of the trail	5.7
NER	Recreation Emphasis Area - north/northeast facing slope	Where the COET passes through emphasis area NEF; 50 foot zone on each side of the trail	34.1
SWR	Recreation Emphasis Area - south/southwest facing slope	Where the COET passes through emphasis area SWF; 50 foot zone on each side of the trail	23.9
POW	Powerline Safety Emphasis Area	Zone approximately 150 feet on each side of powerline right-of-way where it passes through or adjacent to proposed treatment areas	59.1
LOW	Low Intensity Fire Emphasis Area	Approximate 200 foot zone adjacent to private land boundaries in forest restoration units	101.7

Emphasis Area Shortname	Emphasis Area Name	Emphasis Area Location	Total Acres in Emphasis Area
NES	Wildlife Habitat Emphasis Area - northern goshawk nesting	North/northeast facing slope forested stand located adjacent to a goshawk protected activity center (PAC), unit 27	124.5
FLE	Wildlife Habitat Emphasis Area – northern goshawk post-fledging	South/southwest facing slope forested stand located adjacent to a goshawk protected activity center (PAC), unit 28	67.4
PAC	Wildlife Habitat Emphasis Area - northern goshawk Protected Activity Center	Northern goshawk protected activity center (PAC) located in the southern portion of the project area, unit 24	198.0

Figure 13 Proposed Forest (Ecological) Restoration Emphasis Areas

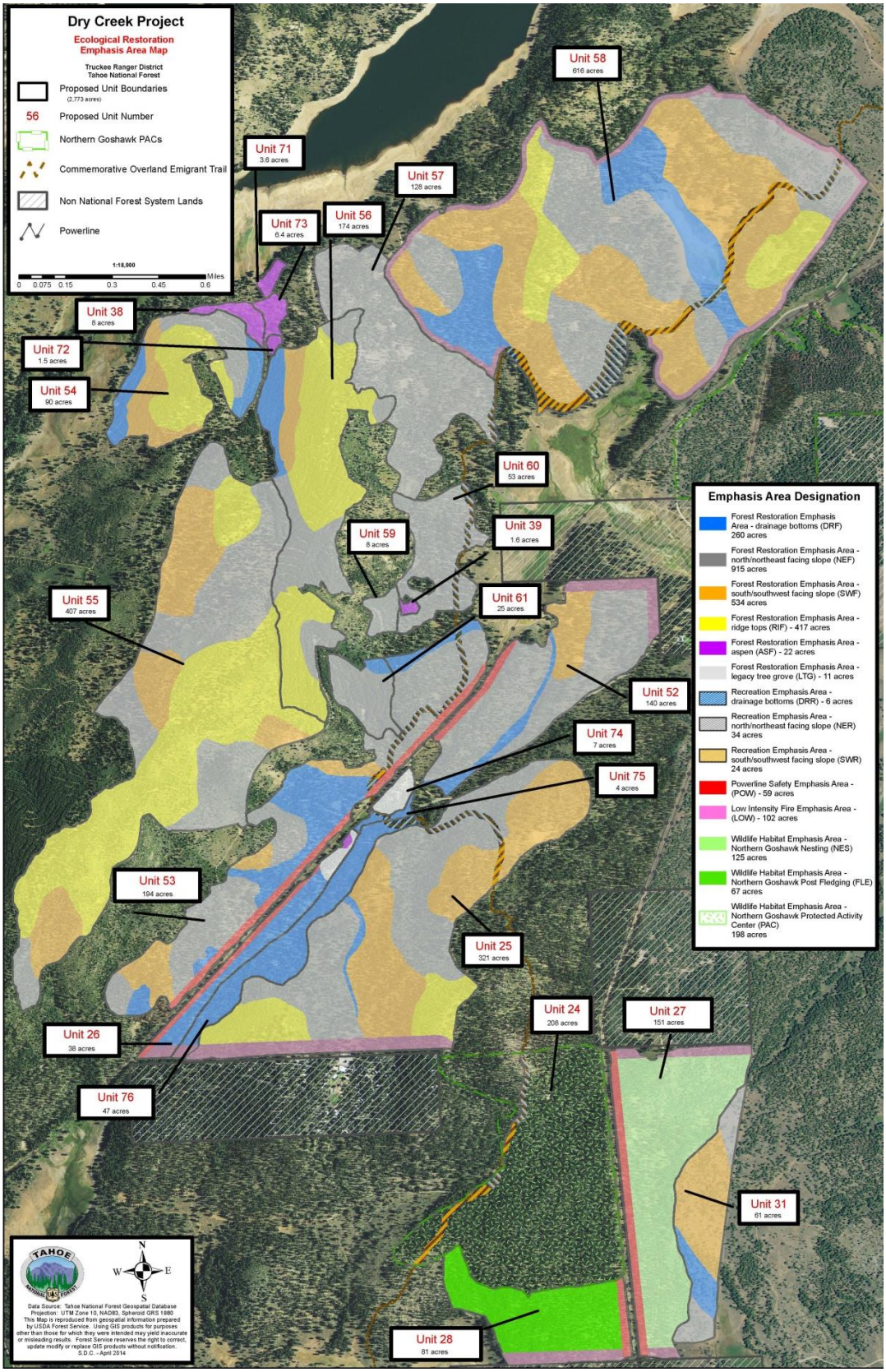
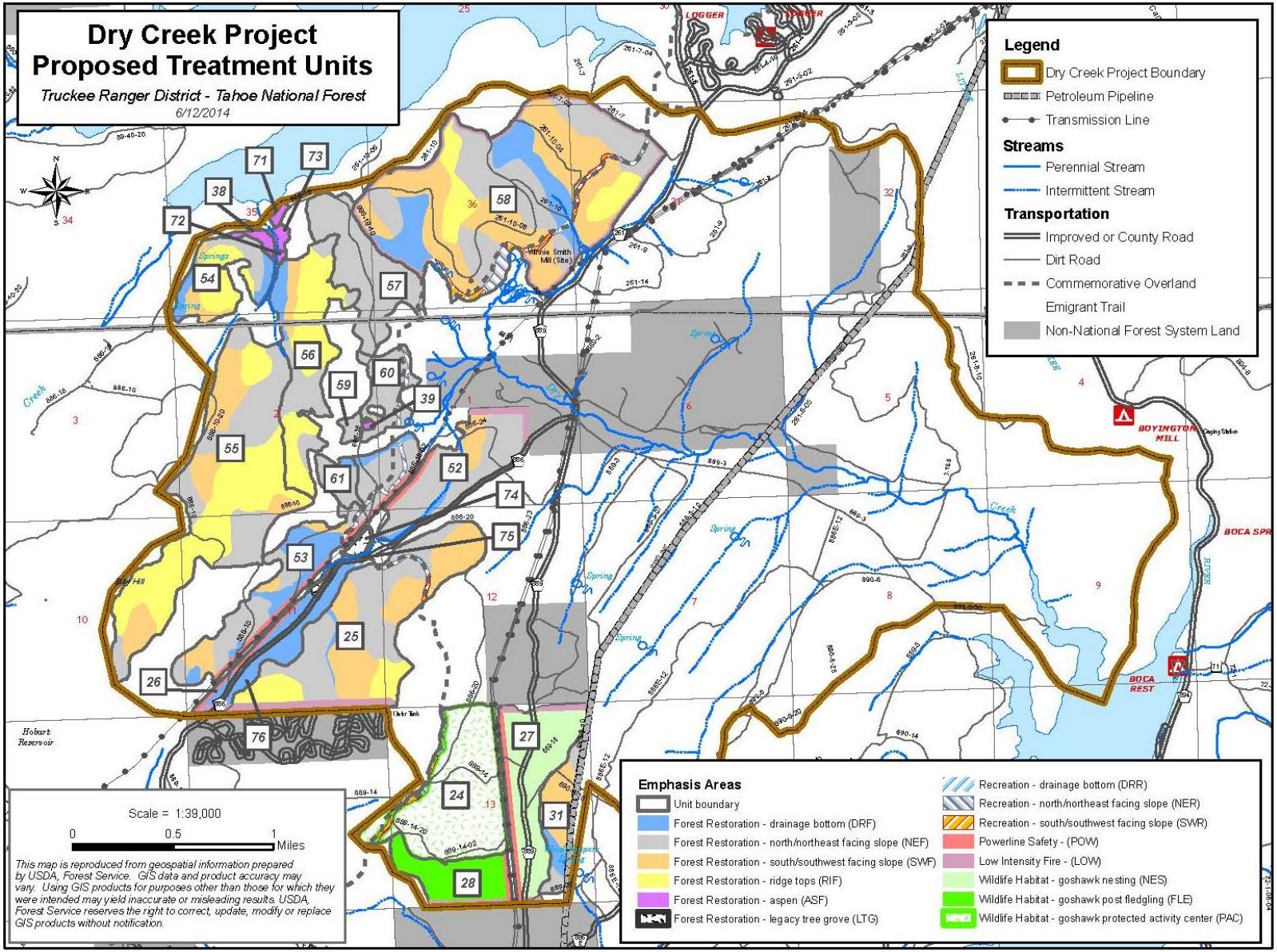


Figure 14: Proposed Forest (Ecological) Restoration Units in Relation to the Dry Creek Project Area



DRF - Forest Restoration Emphasis Area -drainage bottoms

Stream courses and other relatively mesic canyon bottom areas are known to be preferable habitat for many wildlife species. They tend to have more herbaceous vegetation cover and microhabitats, provide more escape cover, are accessible to permanent water sources, and support a larger volume and diversity of vertebrates and invertebrates. This emphasis area is designated with the intention to maintain and enhance these types of conditions. This would maintain and improve habitat conditions in general for wildlife and specifically for northern goshawk, and would support rich biodiversity. These areas would be composed of higher proportions of dense vegetation and structural diversity compared to neighboring topographic areas. However, these features should still be concentrated in areas that the landscape can functionally support based on topography and water availability. Other goals of this emphasis area include creating site scale, stand scale and landscape scale heterogeneous forest conditions that would be expected to develop with active fire; reducing hazardous fuel loadings; and enhancing the ecological role of fire.

Figure 15: Example DRF Stand

NEF - Forest Restoration Emphasis Area - north/northeast facing slope

The primary goal of this emphasis area is to move towards a more heterogeneous forest that will improve resiliency to fire and climate induced stresses and would be more representative of site and stand scale conditions (based on topography) that would develop with active fire. This goal is coupled with maintaining, enhancing, or helping to develop suitable habitat for northern goshawks. This involves retaining individual trees, small groups of trees, retaining dense cover areas and creating small early seral openings that can support groups of younger cohorts of a variety of species. Other goals include reducing hazardous fuel loadings and enhancing the ecological role of fire. These goals would be achieved through a combination of carefully designed silvicultural and/or fire/fuels prescriptions. This emphasis area would support relatively more basal area (BA) and canopy cover (CC) than ridges or south/southwest facing slopes. However, it would support less BA and CC than drainage bottoms,

because of their more mesic conditions. Creating these heterogeneous conditions would also moderate fire behavior which would allow the use of prescribed fire to help return the ecological role of fire.

Figure 16: Example (1) NEF Stand with Ladder Fuels and (2) NEF Stand - Plantation

SWF - Forest Restoration Emphasis Area - south/southwest facing slope

The primary goal of this emphasis area is to move towards a more heterogeneous forest that will improve resilience to fire and climate induced stresses and would be more representative of site and stand scale conditions (based on topography) that would develop with active fire. This goal is coupled with reducing hazardous fuels. Overall, basal area (BA) and canopy cover (CC) would be reduced as compared to drainage bottoms and north/northeast facing slopes, however the intent is to reduce BA only to a level that would help increase the pace of tree growth so that a higher percentage of the BA is in larger (greater than or equal to 20 inch dbh) trees in a shorter amount of time. A more heterogeneous forest would be created by retaining individual trees, small groups of trees, retaining existing dense cover areas and creating small early seral openings that can support groups of younger cohorts of a variety of species. Other goals include maintaining and enhancing northern goshawk habitat, particularly foraging habitat, and enhancing the ecological role of fire. These goals would be achieved through a combination of carefully designed silvicultural and/or fire/fuels prescriptions. It is anticipated that these prescriptions would mimic how the emphasis area would have developed with more active fire and would move potential fire behavior to a more manageable mixed severity.

Figure 17: Example SWF Stand - Natural Regeneration

RIF - Forest Restoration Emphasis Area - ridge top

The primary goal of this emphasis area is to reduce fuels in order to facilitate conditions that would result if fire were more active in the ecosystem. This is compatible with stand level ecological restoration and a more heterogeneous forest, which is the secondary goal of this emphasis area. This would improve forest stand resilience to fire and climate induced stresses as well. Overall, basal area (BA) and canopy cover (CC) would be reduced as compared to drainage bottoms, north/northeast facing slopes, and south/southwest facing slopes, however the intent is to produce stand conditions that are more similar to those that would have been produced under a historic natural fire regime I (based on topographic position). A more heterogeneous forest will be created by retaining individual trees with particular emphasis on trees more suited to xeric environments, retaining small groups of trees, retaining existing dense cover areas and creating small early seral openings that can support groups of younger cohorts of a variety of species. Other goals include enhancing the ecological role of fire and maintaining and enhancing northern goshawk habitat. These goals would be achieved through a combination of carefully designed silvicultural and/or fire/fuels prescriptions. It is anticipated that these prescriptions would mimic how the emphasis area would have developed with more active fire and would move potential fire behavior to a more manageable mixed severity.

Figure 18: Example RIF Stands

ASF - Forest Restoration Emphasis Area – aspen

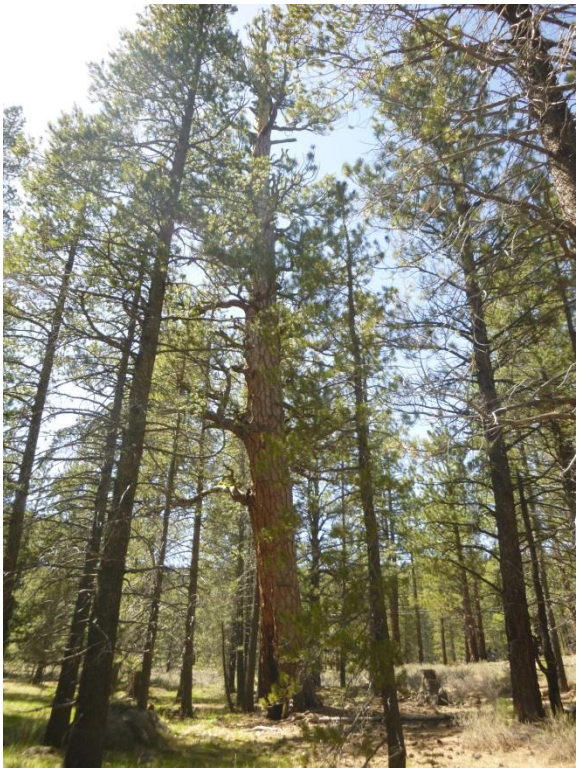
The ASF emphasis area has one primary goal; to improve conditions for aspen stand growth and expansion which will result in stand level ecological restoration of the aspen stands. However this goal is solely focused on a small forest stand scale. This does not represent all aspen stands in the greater Dry Creek area. It focuses on aspen stands most at risk and those that are within or adjacent to other forest restoration treatment areas. Under a more active fire regime, conifer encroachment into aspen stands would be minimized and the aspens would be able to reproduce through suckering and/or seeding. However, with a lack of fire disturbances, conifers are able to shade out aspens and impede successful reproduction. The only objective considered in this emphasis area is to restore aspen stands by introducing disturbance to increase regeneration, minimizing direct conifer competition to existing aspens, and removing conifers to the extent that the aspen stand could expand appropriately to the extent site conditions would allow.

Figure 19: ASF - Conifer Overtopping Aspen

LTG - Forest Restoration Emphasis Area - legacy tree grove

The goal for this emphasis area is focused due to its small size and localized nature. Two small groves of large trees were identified in the project area. These groves are located in close proximity to one another and contain high concentrations of some of the largest and oldest Jeffrey and ponderosa pine trees known on the east side of the Truckee Ranger District. These areas seem to show few signs of management in the last 200 years except for fire suppression. It is unknown why these areas have not seen active vegetation management over time. Fire suppression has allowed high amounts of shade tolerant trees and lodgepole pine to thrive within this emphasis area under the large "legacy" trees. This increases the risk of stand replacing wildfire, and it also creates high amounts of competition for the legacy trees even in the more mesic environments where these trees reside. In order to ensure these structures remain on the landscape for future generations in the face of fire and climate induced stresses, the goal is to reduce competition and stresses on the legacy trees while also removing ladder fuels to minimize the risk of stand-replacing wildfire. The size and unique forest structures of this emphasis area dictate creating conditions that are solely designed to benefit these legacy trees.

Figure 20: LTG - Legacy Trees with Competing Trees



DRR, NER, SWR – Recreation Emphasis Areas – drainage bottoms, north/northeast facing slopes, south/southwest facing slopes

The goal for these areas is very focused due to the small total size of these emphasis areas. The Commemorative Overland Emigrant Trail (COET) is one of the most accessible and popular trails on the Truckee Ranger District. It is a non-motorized trail that gets heavy use from day hikers and mountain bikers. It is also one of the eastern most designated trails on the district and therefore gets the earliest

and latest use in a given year. Since the trail traverses many slopes and drainages, it overlaps the DRF, NEF, and SWF emphasis areas described above. These three recreation emphasis areas, DRR, NER, and SWR, occur within 50 feet of either side of the COET as overlapped on DRF, NEF, and SWF emphasis areas respectively. Although there are other parts of the COET that occur in the project area, the emphasis areas for treatment only overlap other areas proposed for forest restoration treatments. Since the trail traverses many slopes and drainages, conditions on the trail can be widely diverse. Early in the year, the south facing slopes can be clear while the drainage bottoms can be snow covered and impassible, versus late in the year, the south facing slopes can be very hot and dusty when the north facing slopes and drainage bottoms are shaded and cool. In the early season, users, thinking the trail is free of snow, are then forced to trek through the snow or maneuver off trail in drainages or on north facing slopes. Not only does this interrupt the user experience, it can also increase erosion and sedimentation into nearby streams. Therefore these emphasis areas are designed to manage the amount of solar exposure by slope to which the trail is exposed. Treatments such as light thinning to allow more solar exposure to facilitate an earlier snow melt would reduce user-caused erosion or resource damage. Conversely, in order to improve summer shading on the COET, more crown cover needs to exist close to the trail. Within these 50 foot zones on each side of the COET, treatments would be designed to improve conditions on the trail.

Figure 21: Example of COET Trail in NER

POW – Powerline Safety Emphasis Area

The goal for this area is very focused due to the small size of this emphasis area. Proposed management in this area is designed to mitigate hazard trees (defined using Forest Health Protection Report # RO-12-01, *Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region*, Angwin et al. 2012) in and adjacent to utility corridors that overlap potential treatment areas. In addition, it is designed to manage vegetation in and adjacent to powerline rights-of-way. This vegetation management would include ladder and surface fuel removal in a 150 foot zone on each side of the powerline right-of-way. This is designed to keep any potential powerline fires from finding a nearby receptive fuel bed while also protecting the powerlines from a wildlife in the adjacent forest. This vegetation and fuels management would help to maintain appropriate clearances and manage hazards.

Figure 22: Example POW Emphasis Area

LOW – Low Intensity Fire Emphasis Area

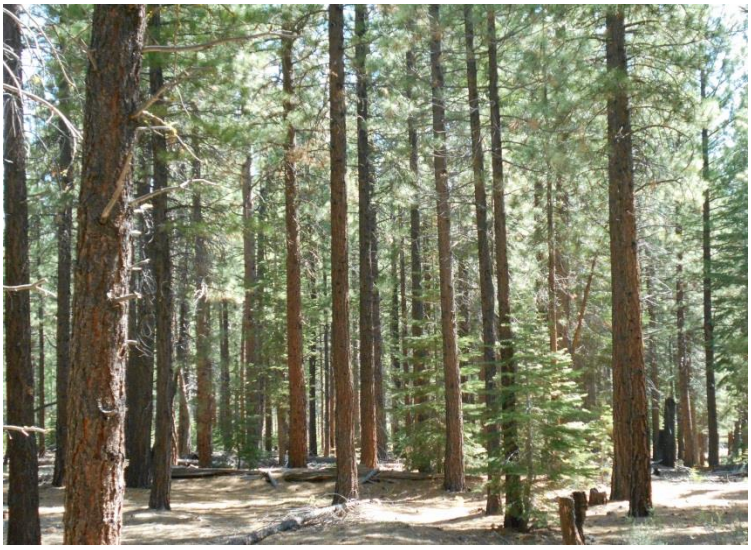
The goal for this area is also very focused due to the small size of the emphasis area. This 200 foot zone, within a Wildland Urban Interface (WUI) defense zone, located directly adjacent to private land boundaries is an important focused zone in terms of reducing fuel and minimizing fire behavior because of its strategic location. In this zone, it is important to produce and maintain conditions that will support only ground fire, even under more severe fire conditions than what might be managed for in the general forest. The primary goal of this emphasis area is to focus the most intense fuels reduction activities in the approximate 200 foot wide zone adjacent to private land. This goal is aimed at keeping ground conditions for minimal fire behavior far into the future with a minimum amount of maintenance.

Figure 23: Example LOW Emphasis Area

NES - Wildlife Habitat Emphasis Area - northern goshawk nesting

The primary goal of this emphasis area is to improve overall nesting habitat as well as nesting habitat microsite conditions for the northern goshawk. This emphasis area is almost entirely on a north/northeast facing slope. Typically, northern goshawk nests are found on this topographic position of the landscape. Emphasis would be placed on creating or maintaining vegetative diversity, increasing overall basal area in large trees, retaining stands of mature trees, and ensuring that a portion of the area provides forest stands that have structural attributes necessary for nesting habitat. Further, this particular emphasis area is strategically placed adjacent to a designated northern goshawk protected activity center (PAC) in order to enhance the habitat of a potential northern goshawk nesting pair. This goal is coupled with designs to move towards a more heterogeneous forest that would improve resilience to fire and climate induced stresses and would be more representative of site and stand scale conditions (based on topography) that would develop with active fire. Other goals include reducing hazardous fuel loadings and enhancing the ecological role of fire. These goals would be achieved through a combination of carefully designed silvicultural and/or fire/fuels prescriptions. Creating these heterogeneous conditions would also moderate fire behavior which would allow the use of prescribed fire to help return the ecological role of fire.

Figure 24: Example NES Stand



FLE - Wildlife Habitat Emphasis Area – northern goshawk post-fledging

The primary goal of this emphasis area is to improve post fledging habitat and microsite conditions for the northern goshawk. Post-fledging areas surround the nest area(s) and are used by both adults and the young as they learn to hunt from the time of fledging through dispersal (Reynolds et al. 1992, Kennedy et al. 1994). Post fledging habitat generally consists of a variety of forest conditions that provide for a diverse prey base for goshawk foraging as well as pockets of higher cover for roosting and protection. Emphasis should be placed on creating or maintaining vegetative diversity, increasing basal area in large trees, retaining stands of mature trees, especially along forest-open edges, creating small openings for prey species, and maintaining pockets of high cover. This emphasis area is almost entirely on a south/southwest facing slope. Further, this particular emphasis area is strategically placed adjacent to a designated northern goshawk protected activity center (PAC) in order to enhance the habitat of a potential northern goshawk nesting pair's offspring and to enhance habitat in the larger home range. This goal couples with designs to move towards a more heterogeneous forest that will improve resilience to fire and climate induced stresses and would be more representative of site and stand scale conditions (based on topography) that would develop with active fire. A more heterogeneous forest would be created by retaining individual trees, small groups of trees, retaining existing dense cover areas and creating small early seral openings that can support groups of younger cohorts of a variety of species. Other goals include reducing hazardous fuels and enhancing the ecological role of fire. These goals would be achieved through a combination of carefully designed silvicultural and/or fire/fuels prescriptions. It is anticipated that these prescriptions would mimic how the emphasis area would have developed with more active fire and would move potential fire behavior to a more manageable mixed severity.

Figure 25: Example FLE Stand

PAC - Wildlife Habitat Emphasis Area - northern goshawk Protected Activity Center

The primary goal of this emphasis area is to reduce the threat of stand replacing fire within the designated PAC while maintaining or enhancing habitat. Per current SNFPA (2004) direction, when designing treatment unit intersections with PACs, limit treatment acres to those necessary to achieve strategic placement objectives and avoid treatments adjacent to nest stands whenever possible. Prescribed burning is allowed within a 500-foot radius buffer around the nest site. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important habitat elements. For PACs located in a WUI defense zone, mechanical treatments may be conducted to meet fuels objectives. For PACs located in WUI threat zones, mechanical treatments are allowed where prescribed fire is not feasible and where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Even though this PAC is located partially in a WUI defense zone and partially in a WUI threat zone, mechanical treatments are not necessary to achieve effectiveness of the landscape scale strategy. The primary goal of this emphasis area can be achieved through prescribed fire. The secondary goal in this emphasis area is to enhance the ecological role of fire.

Figure 26: Example PAC Emphasis Area

Treatment Prescriptions and Methods

The proposed action would apply a suite of integrated silvicultural/forest restoration and fire/fuels prescriptions within each treatment unit. Application of the prescriptions (via various treatment methods) would set the stage for achieving emphasis area treatment objectives, described in the preceding section.

Table 2 *Prescription and Method Summary* displayed below shows units, emphasis areas, and proposed treatment prescriptions and methods. The descriptions of the prescriptions and methods are detailed in sections below Table 2, in ***Treatment Prescriptions*** and ***Treatment Methods*** respectively.

Order of Prescription Application

Implementing the following silvicultural/forest restoration and fire/fuels prescriptions involves both the careful consideration of the current conditions of the stand and also how the stand would be influenced by fire. Current conditions in the stand reflect how resilient the stand may be to disturbances and, when considered with the surrounding areas, how homogeneous conditions may be. The potential follow-up application of fire/fuels prescriptions, the stand structure conditions that would likely develop with active fire; and how a wildland fire might move through the stand need to be considered. On-the-ground decisions about which individual trees and groups of trees to retain are made in light of (1) ensuring overall stand structure will remain intact following application of prescribed fire and (2) mimicking stand structures that would develop under active fire conditions.

The prescriptions can be highly variable and site-specific, and are set within the context of the existing stand's structure, tree species composition, and as compared to the emphasis area objectives for each area.

For units within the Dry Creek Project, implementing the following prescriptions involves first referring to the emphasis area goals and how they compare to the current conditions in the units. It is important to note that not all prescriptions would be applied to every emphasis area in every unit; it is completely

based on how to move the current conditions toward the emphasis area goals. When the following prescriptions are applied, they are done so in a step-wise fashion; the list reflects the order of priority for prescription application - one building on the other. For example, variable density thinning would not be applied without first implementing a dense cover area prescription. Basal area retention targets play a major role in how many of the following prescriptions are applied and to what levels. For example if a given basal area retention target is met by just implementing dense cover area and large tree recruitment prescriptions, then variable density thinning would not occur. The list below reflects the prescriptions in the "tool box" that are proposed to achieve emphasis area goals.

- The first step involves identifying both the dense cover areas (DCAs) and early seral openings (ESOs), and laying out their boundaries out on the ground. DCAs and/or ESOs may or may not be designated in various emphasis areas depending on the emphasis area goals.
- Next, the trees suitable for a large tree recruitment prescription are identified and the surrounding trees proposed for removal are marked. This is also dependent on the current stand conditions and emphasis area goals.
- After this is done, the variable density thinning mark is anchored to DCAs, ESOs, and large tree recruitment prescriptions where present.
- In addition, the suppressed cut prescription is applied to remove suppressed trees contributing to ladder fuels outside of DCAs.
- Finally in subunits (emphasis areas) where the current snag densities are substantially below desired densities, decadent feature enhancements (partial tree girdling) would be identified for implementation within DCAs.
- In specific units and/or emphasis areas, the legacy tree treatment, plantation thin, and aspen restoration prescriptions are applied.
- Following all these, primarily silviculture/forest restoration based, prescriptions, fire/fuels prescriptions are applied and decisions are made on whether surface fuel and/or ladder fuel prescriptions are needed to help move the stands toward those that could support active fire.
- Once all prescriptions are applied, treatment methods are identified to implement the prescriptions.

Unit-Specific Prescriptions and Treatments

Silvicultural/forest restoration and fire/fuels prescriptions and methods proposed for each treatment unit are displayed in Table 2 below. *See Map in Appendix A for detailed unit/emphasis area locations.*

Table 2: Prescription and Method Summary

Unit	Total Acres	Emphasis Area	Emphasis Area Acres	Treatment Prescription - See Descriptions Below	Treatment Method – See Descriptions Below
24	208.3	NER	4.2	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		SWR	6.1	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn

Unit	Total Acres	Emphasis Area	Emphasis Area Acres	Treatment Prescription - See Descriptions Below	Treatment Method – See Descriptions Below
		PAC	198.0	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
25	320.5	DRF	4.2	Plantation Thin, Ladder Fuel Treatment	Mastication
		LOW	24.3	Plantation Thin, Ladder Fuel Treatment	Mastication
		NEF	128.0	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mastication
		NER	3.8	Plantation Thin, Ladder Fuel Treatment	Mastication
		RIF	42.3	Plantation Thin, Ladder Fuel Treatment	Mastication
		SWF	116.2	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mastication
		SWR	1.7	Plantation Thin, Ladder Fuel Treatment	Mastication
26	38.1	ASF	0.7	Aspen Restoration	Mechanical
		DRF	21.6	Dense Cover Area, Large Tree Recruitment, Suppressed Cut, Decadent Feature Enhancement, Ladder Fuel Treatment	Mechanical, Hand Thin/Pile, Pile Burn
		LOW	2.2	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Hand Thin/Pile, Pile Burn
		LTG	4.1	Legacy Tree Treatment, Suppressed Cut, Ladder Fuel Treatment	Mechanical, Hand Thin/Pile, Pile Burn
		POW	9.5	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Hand Thin/Pile, Pile Burn
27	150.5	LOW	8.3	Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
		NES	124.5	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
		POW	17.7	Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
28	80.6	FLE	67.4	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
		LOW	8.8	Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
		POW	4.4	Surface Fuel Treatment, Ladder Fuel Treatment	Mechanical, Underburn
31	61.0	DRF	9.9	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		NEF	14.5	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		SWF	36.6	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
38	8.0	ASF	8.0	Aspen Restoration	Mechanical

Unit	Total Acres	Emphasis Area	Emphasis Area Acres	Treatment Prescription - See Descriptions Below	Treatment Method – See Descriptions Below
39	1.6	ASF	1.6	Aspen Restoration	Mechanical
52	140.2	DRF	10.4	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
		LOW	9.8	Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
		NEF	95.4	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
		POW	6.3	Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
		SWF	18.3	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
53	194.1	DRF	51.0	Dense Cover Area, Large Tree Recruitment, Suppressed Cut, Decadent Feature Enhancement, Ladder Fuel Treatment	Mechanical, Mastication
		NEF	90.3	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Suppressed Cut, Decadent Feature Enhancement, Ladder Fuel Treatment	Mechanical, Mastication
		SWF	23.4	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Suppressed Cut, Decadent Feature Enhancement, Ladder Fuel Treatment	Mechanical, Mastication
		DRR	1.0	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Mastication
		NER	6.7	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Mastication
		SWR	0.5	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Mastication
		POW	21.2	Suppressed Cut, Ladder Fuel Treatment	Mechanical, Mastication
54	90.0	DRF	17.7	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		NEF	18.3	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		RIF	34.3	Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		SWF	19.7	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
55	406.7	NEF	138.1	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mastication
		RIF	186.7	Plantation Thin, Ladder Fuel Treatment	Mastication
		SWF	81.9	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mastication
56	173.8	DRF	13.6	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		NEF	49.3	Dense Cover Area, Plantation Thin,	Mechanical, Mastication

Unit	Total Acres	Emphasis Area	Emphasis Area Acres	Treatment Prescription - See Descriptions Below	Treatment Method – See Descriptions Below
				Ladder Fuel Treatment	
		RIF	97.5	Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		SWF	13.4	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
57	128.4	NEF	126.5	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Mastication
		NER	1.9	Suppressed Cut, Ladder Fuel Treatment	Mastication
58	615.8	DRF	83.4	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Variable Density Thin, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		DRR	2.1	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		LOW	46.9	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		NEF	175.3	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Variable Density Thin, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		NER	12.6	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		RIF	55.8	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Variable Density Thin, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		SWF	224.1	Dense Cover Area, Early Seral Opening, Large Tree Recruitment, Variable Density Thin, Decadent Feature Enhancement, Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
		SWR	15.6	Surface Fuel Treatment, Ladder Fuel Treatment	Underburn
59	8.1	NEF	8.1	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
60	53.2	NEF	48.3	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Mastication
		NER	4.9	Suppressed Cut, Ladder Fuel Treatment	Mastication
61	25.4	DRF	2.2	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication
		NEF	23.2	Dense Cover Area, Plantation Thin, Ladder Fuel Treatment	Mechanical, Mastication

Unit	Total Acres	Emphasis Area	Emphasis Area Acres	Treatment Prescription - See Descriptions Below	Treatment Method – See Descriptions Below
71	3.6	ASF	3.6	Aspen Restoration	Underburn
72	1.5	ASF	1.5	Aspen Restoration	Mechanical
73	6.4	ASF	6.4	Aspen Restoration	Hand Thin/Pile, Pile Burn
74	7.0	LTG	7.0	Legacy Tree Treatment, Suppressed Cut, Ladder Fuel Treatment	Mechanical, Hand Thin/Pile, Pile Burn
75	3.7	DRF	3.1	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
		DRR	0.6	Suppressed Cut, Ladder Fuel Treatment	Hand Thin/Pile, Pile Burn
76	46.7	DRF	43.3	Dense Cover Area, Variable Density Thin, Suppressed Cut, Ladder Fuel Treatment	Mastication
		DRR	2.0	Suppressed Cut, Ladder Fuel Treatment	Mastication
		LOW	1.4	Suppressed Cut, Ladder Fuel Treatment	Mastication

Table 3: Summary of Treatment Units, Emphasis Area Acres, and Watershed Restoration Sites

Total Area within Project Boundary *Acres*	NFS Lands within Project Boundary *Acres*	Total Acres within Forest (Ecological) Restoration Treatment Units *Acres* (Percentage of Total Area in Project Boundary) (Percentage of NFS Lands in Project Boundary)		Total Acres within Watershed Restoration Sites (Percentage of Total Area in Project Boundary) (Percentage of NFS Lands in Project Boundary)	
8,154	7,224	2,773.2 (34%) (38%)		31.8 (0.39%) (0.44%)	
Total Acres of Each Emphasis Area within Treatment Units (Percentage of Emphasis Areas in Treatment Units)		Emphasis DRF	260.4 (9.4%)	Site 1	14.2
		Emphasis NEF	915.3 (33%)	Site 2	5.6
		Emphasis SWF	533.6 (19.2%)	Site 3	3.0
		Emphasis RIF	416.6 (15%)	Site 4	5.5
		Emphasis ASF	21.8 (0.8%)	Site 5	1.1
		Emphasis LTG	11.1 (0.4%)	Site 6	0.4
		Emphasis DRR	5.7 (0.2%)	Site 7	2.0
		Emphasis NER	34.1 (1.2%)	Total	31.8
		Emphasis SWR	23.9 (0.9%)		
		Emphasis POW	59.1 (2.1%)		
		Emphasis LOW	101.7 (3.7%)		
		Emphasis NES	124.5 (4.5%)		
		Emphasis FLE	67.4 (2.4%)		
		Emphasis PAC	198 (7.1%)		

Treatment Prescriptions

DCA and ESO – Dense Cover Areas (DCAs) and Early Seral Openings (ESOs)

Ideally, dense cover areas (DCAs) are small areas distributed within treatment units that provide continuous vertical and horizontal cover with a mixture of shrubs and trees along with large and small down wood, and snags. DCAs would typically contain clumps of trees of various size classes as well as a variety of snag and down wood sizes. These existing DCAs, ranging in size from 0.25-1 acre, would contribute to/enhance within-stand horizontal and vertical structural diversity and provide important old forest and/or mid seral habitat elements. For example existing DCAs can be representative of multiple layered late seral conditions with high levels of decadence and dead wood. They can also represent a more mid seral condition with brush and a medium sized tree overstory that provide important movement, hiding, and resting cover for wildlife.

ESOs would be comprised of dense young regenerating trees and/or shrubs to provide early successional habitat within larger stands managed for late successional or old forest habitat. ESOs, from 0.25-1 acre, would enhance within-stand age and species diversity as well as provide prey and foraging habitat for old forest associated wildlife species. In this project it is expected that vegetation diversification would occur through either 1) the planting different species of trees and different genetic strains of trees; or 2) based on site conditions, letting natural regeneration of shrubs and/or trees occur.

Two primary methods would be used to retain and create DCAs or ESOs: For DCAs, an area would be designated that has multiple wildlife habitat elements, such as large down woody material, a mixture of tree age classes (including solitary and groups of large trees), large snags, multiple tree canopy layers; and/or trees with features associated with wildlife use (for example, platforms, mistletoe brooms, forked tops, and cavities). No mechanical tree removal would be conducted in these DCAs. For ESOs, by taking advantage of existing conditions such as areas of sparse tree cover, thinner soils, or pockets of extensive tree mortality, openings would be created by removing most or all of the existing trees and then either planting or allowing natural shrub and/or tree regeneration to create an ESO of early successional habitat.

In general, prescribed fire over the long term could be an important management tool within DCAs and ESOs although only one entry may occur with this project. For DCAs comprised of multiple sizes of trees, snags, and down wood, prescribed fire would be carefully applied to maintain key habitat elements, particularly snags and down wood. While underburning in DCAs would likely result in some mortality of suppressed and subdominant trees, burning prescriptions would be designed to ensure the overall structure of the DCA would remain intact. For ESOs (regeneration areas), prescribed fire would be applied to regenerate shrubs and create suitable areas for shade-intolerant tree species to regenerate.

LTR – Large Tree Recruitment

This prescription revolves around the overall concept of “isolated trees”. Isolated trees can have multiple benefits for a resilient landscape as long as they are intermixed with other forest structures and distributed in unique patterns. Isolated trees tend to be the most resilient trees on the landscape, thus, they have the most potential to become large and will usually do so in the shortest amount of time.

When these trees do die, they become the largest dead wood components on the landscape and remain on the landscape as structure for the longest period of time on average. As described below in the LTT – Legacy Tree Treatment prescription, legacy trees are those trees on the landscape that are the largest and/or oldest trees within a stand. A legacy tree is a large tree (typically greater than 24 inches dbh) that has remained on site while most of the original surrounding trees have been removed by either timber harvest or mortality due to fire, insects, drought, or disease. Hence, a legacy tree tends to be at least a generation older than the trees in the surrounding stand and is one of the largest trees in the stand. The goal of the LTR – Large Tree Recruitment prescription is to manage for isolated trees with the intent that these isolated trees will become the legacy trees of the future.

An isolated tree is defined by being located at least 20 feet (6 meters) away from the bole of any neighboring tree and no more than 50 feet (15 meters) from the bole of any neighboring tree (Churchill et al. 2013). Isolated trees, in one study, accounted for 32% of the total trees with 51% of the basal area in reference plots that experienced active fire (Churchill et al. 2013). Therefore, isolated trees should be the largest, fastest growing trees available and could possibly compose as much as 30% of the stand's trees. The ratio of isolated trees compared to groupings of trees, more dense cover areas (DCAs), and unencumbered early seral openings (ESOs), however, would fluctuate as stand's topographic position on the landscape changes.

In order to apply LTR prescription, it is first necessary to establish the objectives of each emphasis area from reference plot informed science. Then the current isolated tree population is ascertained from stand walkthroughs. The LTR prescription is then prescribed to move those current conditions towards objectives by creating a percentage of isolated trees on the landscape. The prescription would be constrained by the overall basal area retention targets of the given emphasis area. Candidate tree(s) to be isolated are then identified based on specific criteria. A candidate tree is generally well established and vigorously growing. Although they are typically large, they may not be the largest tree in the stand. They would however have the most potential to remain on the landscape for the longest period of time. This determination is based on species, location, and implied genetics based on growth form. Once a candidate tree is selected, mapped (GPS), and painted, the marking crew then designates for removal trees less than 24 inches dbh adjacent to the selected candidate isolated tree(s). Treatment is designed to increase the resiliency of the selected candidate isolated tree(s) to be isolated from the effects of fire, drought, pathogens and disease while also maximizing the potential for diameter and height growth. Removing trees from around the selected tree(s) would result in increased tree root and diameter growth while improving overall health and resiliency of the tree. In addition, the removal of understory trees, particularly the shade tolerant, less fire-resistant white fir, removes ladder fuels, which minimizes the risk that fire could carry into the canopy of the isolated tree(s).

The distance of the treatment around candidate isolated tree(s) would be variable and based on site-specific conditions (such as extent of the drip line, aspect, and topography). For example, candidate isolated tree(s) on slopes greater than 25 percent can have a treatment distance that extends as much as 40-50 feet from the bole of the selected tree to be isolated. In flatter areas, treatment distances can be shorter as flame lengths would be lower compared to those occurring on steeper slopes. Another example; the treatment distance may be longer on the south side of the candidate isolated tree versus

the north side of the tree, based on expected topographic effects of the sun. Generally treatment distances would be about 30 feet from the bole of the tree, but would extend at least 20 feet and would not surpass 50 feet. However, the marking crew would still be constrained by the basal area targets of that particular emphasis area. Therefore, if the basal area monitoring that is occurring concurrently with the mark is showing that the basal area reduction limit has been or is close to being exceeded, then adjustments to the mark for removal would occur. The marking crew may not remove as many trees around the selected tree(s) or may forego treatment altogether.

VDT – Variable Density Thin

The variable density thin prescription is highly site-specific, set within the context of the existing stand's structure and tree species composition. In general, variable thinning involves selective removal and retention of individual codominant and subdominant trees and/or small groups of codominant and subdominant trees. Variable thinning would occur throughout the areas outside of dense cover areas, early seral openings, and large tree recruitment areas, varying by the prescriptions designed for each emphasis area. Thinning would be conducted to meet treatment subunit level objectives of basal area, canopy cover, tree species composition, and fire behavior (as described under "Prescription Metrics" below), and to increase stand level structural heterogeneity. As stated above, and especially for a VDT prescription, implementation involves careful consideration of fire: both the follow-up application of prescribed fire, as well as the stand structure conditions that would likely develop under active fire conditions. On-the-ground decisions about which individual trees and groups of trees to retain would be made in light of (1) ensuring overall stand structure would remain intact following possible application of prescribed fire and (2) mimicking stand structures that would develop under active fire conditions.

Variable density thinning objectives include: (a) enhancing stand heterogeneity (by retaining groups of larger trees that can provide valuable wildlife habitat and creating subtle openings by thinning around these groups), (b) reducing fuels, and (c) working towards stand level ecological restoration. The variable thinning approach is based on the GTR 220 principle that varying stem density according to potential fire intensity effects on stand structure can create horizontal heterogeneity inherent to these landscapes. As such, the variable thinning primarily focuses on removing ladder fuels, subdominant and co-dominant shade-tolerant trees (such as white fir), and some subdominant and co-dominant shade-intolerant trees (such as Jeffrey or ponderosa pine). It is not based on spacing guidelines but rather works within the context of the existing stand to emphasize retaining desired tree species compositions, basal areas, and desired stand structure elements (such as trees with some level of decadence or "defect").

Variable thinning would be applied using the following guidelines:

- Generally favor retention of pines over firs, especially in southerly facing areas and on ridges. Retained groups of larger trees (described under the bullet below) may include fir trees. Overall the emphasis for retained groups of trees is preserving or enhancing desirable stand structure rather than managing for any particular species composition.
- Retain groups of larger trees, generally comprised of five to ten (or more) trees of roughly similar size. Ideally, some of the retained trees should have desirable habitat features, such as

forked or broken tops. Remove trees adjacent to these retained groups to improve the overall health and resiliency of the group to drought, insects and disease.

- Where a few (less than five) trees occur together, or where trees are scattered, retain the more vigorous trees by removing subdominant and, in some cases, co-dominant trees around them to reduce ladder fuels and competition for light, water, and nutrients.
- In areas of greater white fir dominance where large trees tend to grow in more of a clumped nature, emphasize retaining clumps or groups of generally five to ten trees and removing trees adjacent to these retained clumps to create small, variably shaped gaps.
- When making site-specific determinations on individual tree removal/retention preferences, vary the choices made so as to increase the variability at the micro-site scale.

SC – Suppressed Cut

A suppressed tree is typically no larger than ten inches dbh (usually ranging between one and five inches dbh) *and* is a component of a stand's understory where there is an overstory of dominant, co-dominant, and subdominant trees. Suppressed trees, in general, have little capacity to release (initiate increased growth rates), even if the overstory is removed. The suppressed cut would remove suppressed trees (down to one inch dbh for hand thinning and mastication and down to three inches dbh for mechanical thinning) within treatment units outside of dense cover areas. The suppressed cut prescription would not be applied within dense cover areas. This would retain a percentage of the suppressed tree size class within the treatment units, enhancing within-stand variability from a tree size standpoint.

DFE – Decadent Feature Enhancement

This prescription involves tree girdling for snag creation. Tree girdling would occur inside DCAs and would only be applied in subunits where the current snag densities are substantially below desired densities. In all cases however, this prescription would not be applied in the LTG, DRR, NER, SWR, POW, and LOW emphasis areas.

Tree girdling would involve 1) manually girdling (cutting off the bark layer deep enough to sever the tree's vascular system in the cambium in a 6-12 inch band covering approximately ½ of the diameter of pine trees) of individual trees 15-30 inches dbh; and/or 2) allowing prescribed fire to girdle/kill trees during underburning operations. The goal of this treatment is to selectively wound and therefore weaken trees. These weakened trees would become more susceptible to environmental stresses, insect attack, and/or fungus/rot infection and therefore become snags likely before a neighboring, non-girdled tree would. By girdling and wounding trees, it is anticipated that the trees would become snags over a longer timeframe rather than die immediately, like what would happen if a tree were completely girdled.

The selection of trees for partial tree girdling would occur within DCAs after they have been designated. These trees selected for partial girdling in DCAs would be designated based on the site specific conditions in the DCAs and would be trees that would provide needed habitat structure in the DCAs such as split tops, cavities, or signs of decadence. This prescription would also be applied in prescribed fire activities, namely underburning. Trees girdled by fire would not be selected and marked prior to

burning, rather it is expected that some wounding and mortality would occur similar to what would happen in stands with active fire.

LTT – Legacy Tree Treatment

Legacy trees are the largest and/or oldest trees within a stand. A legacy tree is a large tree (typically greater than 24 inches dbh) that has remained on site while most of the original surrounding trees have been removed by either timber harvest or mortality due to fire, insects, drought, or disease. Hence, a legacy tree tends to be at least a generation older than the trees in the surrounding stand and is one of the largest trees in the stand. Legacy trees can occur singly or in groups, and often represent tree species that would occur under an active fire regime.

In the LTG emphasis area (Forest Restoration Emphasis Area – legacy tree grove), a substantial number of legacy trees are present. The legacy tree treatment prescription (LTT) involves the mechanical removal coupled with hand cutting and piling of many trees less than 24 inches dbh (with the exception of one tree marked at 26.0 inches dbh) within the legacy tree grove. The purpose of removing trees from around legacy trees is to decrease competition for resources, which results in increased tree root and diameter growth, thus improving overall health and resiliency of the legacy trees. Not every non legacy tree would be treated, nor would every legacy tree have competition eliminated due to the size limitation on trees removed (primarily less than 24 inches dbh). It would be based on the existing stand structure. Treatment is designed to increase the resiliency of large legacy trees from the effects of fire, drought, pathogens, and disease while moving the entire stand to representative of a stand under more active fire conditions. In addition, the treatment of understory trees, particularly less fire-resistant white fir and lodgepole pine, removes ladder fuels, which could carry fire into the canopy of the legacy trees.

PT – Plantation Thin

There are numerous stands in the Dry Creek project area that were either established as plantations in the 1960s and 1970s or grew in naturally following the Donner Ridge wildfire. The plantations are largely comprised of planted Jeffrey and ponderosa pines; however, they also contain young trees that grew in naturally. The naturally regenerated stands post wildfire exhibit slightly more variation in tree sizes and species; however, so few live trees were left post fire, that the seed source of regenerated trees was somewhat limiting. The plantation thin prescription is designed to facilitate and accelerate the continued growth of these young trees. The stands currently contain some trees that survived wildfire and subsequent salvage harvest: these “residual” trees would not be removed. While they do meet the definition of legacy trees, residual trees in these stands would be treated differently than individual or small groups of legacy trees with a focus on removing ladder fuels to minimize the potential for wildfire to adversely affect the stands. There also would be an emphasis on removing ladder fuels on the downhill sides of the residual trees where steep slopes may contribute to flame lengths reaching the residual trees.

Plantation thinning would involve mechanical thinning and/or mastication (mechanical grinding and crushing that *rearranges* material on site) of trees and mastication of brush. Mastication changes a vertical large piece of fuel (i.e. a standing tree) into many smaller pieces of horizontal fuel. This is termed “*rearranging”* the fuels to a condition that allows the material to decompose more rapidly. The

plantation thin prescription would primarily focus on removing and/or rearranging trees between one and 12 inches dbh. An occasional tree between 12 and 18 inches dbh could be removed; however, this would occur only where mechanical cutting and removal systems were used. The majority of trees between 12 and 18 inches dbh would be retained. Because of the nature of these plantations and regenerated stands, and the logistics of marking trees in extremely dense brush, trees would be thinned by description and a spacing guideline would be applied. Typically, retained trees would be spaced roughly 14 to 22 feet apart; however, where logistically possible, existing variable stand structure would be used to increase within-stand horizontal heterogeneity such that there would be some more dense and more open areas. DCAs would be designated before the plantation thin prescription is applied in emphasis areas DRF, NEF, and SWF.

Plantation thinning would retain at least 120 trees per acre. Sufficient tree canopy cover would be maintained to suppress shrub growth under groups of trees; however, retarding shrub growth over the entire treatment unit would not be a specific objective. Although the primary objective of plantation thinning is to accelerate the growth of retained trees, a secondary objective is to foster some within-stand defect trees. To meet this secondary objective, plantation thinning would retain an average of ten to 12 trees per acre with injuries, split tops, and/or porcupine damage.

Shrubs growing under the drip line of retained trees would be masticated. Other areas of snow brush, manzanita, and white thorn outside the drip lines would also be masticated to decrease the fire hazard and provide opportunities for brush regeneration, which in turn provides browse for wildlife. Further, dry land willow (*Salix*), patches of bitterbrush and *Ribes* outside of tree drip lines would not be masticated unless they posed a fire hazard (ladder fuels) to retained trees/groups of trees. *Salix* is valuable as songbird nesting habitat. Bitterbrush is a preferred browse species for mule deer and it occurs in some homogeneous small patches in the plantations. These patches provide valuable foraging habitat. Because bitterbrush and *Ribes* do not regenerate (stump sprout) very well after mastication, unless posing a direct ladder fuels hazard, these species would not be masticated.

In addition to spacing guideline ranges, other measures would be implemented to increase within-stand horizontal heterogeneity. Where less than ten trees per acre are present, no trees would be thinned and shrubs would not be masticated. Because the stands are largely composed of Jeffrey and ponderosa pines, species preference for retention would focus on other species, if they are present. This could mean that a larger pine would be proposed for removal/mastication if it is in close proximity to a tree of another species, such as red fir.

ASP – Aspen Restoration

An aspen restoration prescription involves selectively removing conifers from stands of aspen that are at risk of loss because they are being crowded and shaded by thickets of small lodgepole pine or they are being overtopped by conifers. These stands typically have a much higher percentage of conifers than aspen, and have little aspen regeneration. Conifer removal would occur by hand cutting or mechanical cutting methods. In some cases, larger conifers would be girdled to create snags. When treated by hand, typically most conifers from one to 16 inches dbh would be cut and removed from site. However, some branches and boles of cut trees could also be piled and burned on site. In this case, restrictions on size

and placement of piles would be implemented in order to not damage residual trees and/or aspen root zones. When treated by mechanical means, conifers greater than three inches dbh that are overtopping and/or crowding aspens would be removed. For all stands applying this prescription, conifers greater than 23.9 inches dbh would not be removed with the exception of one lodgepole pine measured at 26.0 inches dbh in unit 26.

SF – Surface Fuel Treatment

A surface fuel treatment prescription is a fire/fuels based prescription designed to manage live and dead fuels at or near the surface of the ground. It is not driven by silviculture purposes, rather by fuels management purposes. A surface fuel treatment prescription is usually implemented by an underburn. Surface fuel treatment prescriptions are typically designed to consume surface fuels and to mimic fire that would occur in active fire conditions. Surface fuel treatment prescriptions can be applied under spring-like and fall-like conditions. Spring-like conditions are defined by relatively high live fuel moistures, high 1000 hour size ("coarse woody debris", three inches diameter and greater) fuel moistures, and soils that are relatively moist beneath the surface fuels. Under spring-like conditions, it is expected that surface fires would have moderate to high consumption of 1-100 hour size fuels ("fine woody debris", ranging from 0.00-2.99 inches diameter) and minimal consumption of 1000+ hour fuels with mortality primarily expected in subdominant tree size classes and shrubs/brush. Fall-like conditions are defined by relatively low live fuel moistures, lower 1000 hour fuel moistures, and drier soils with dry organic layers beneath the litter layer. Under fall-like conditions, it is expected that burning would be primarily surface fires with higher flame lengths, and faster burn times as compared to burning under spring-like conditions. It would have high consumption of 1-100 hour size fuels and moderate to high consumption of 1000+ hour fuels, and with mortality expected in subdominant and some co-dominant tree size classes with high consumption of brush. Depending on cycles of drought and wet weather, spring-like and fall-like conditions can occur throughout the year. For the Dry Creek Project, spring-like condition surface fire prescriptions would be emphasized, however due to limited suitable burning conditions, surface fire prescriptions under fall-like conditions would be implemented in some cases. In these cases, extra measures to protect large dead wood, such as creating fire lines around large logs/snags, would be implemented.

LF – Ladder Fuel Treatment

A ladder fuel treatment prescription in some ways is similar to both the SC – suppressed cut and SF – surface fuel prescriptions. Like the SC prescription, ladder fuel treatments remove many suppressed trees. However, where the SC prescription is primarily driven by silviculture purposes because suppressed trees have little ability to grow in the stand conditions in which they occur; the ladder fuel treatment prescription considers more than just suppressed trees, including all vegetation that makes up the lower levels of stands. Suppressed trees and brush primarily make up ladder fuels. The ladder fuel and SF prescriptions are both driven by fuels management objectives and both treat surface fuels and ladder fuels. However ladder fuel treatments for the Dry Creek Project can be implemented by multiple methods such as mechanical removal, hand thin and pile, mastication, pile burning and underburning. Ladder fuels can link up spatially with subdominant trees, thus connecting the forest floor into the crowns of dominant/co-dominant trees. This connection can greatly increase fire severity and

the potential for crown fire. The LF - ladder fuel prescription removes and/or rearranges these ladder fuels to break the connection from forest floor to dominant tree crowns.

Treatment Methods

The above prescriptions would be implemented using a variety of methods as described below. Prescribed fire refers to any fire ignited by management actions to meet specific objectives. Prescribed fire can include underburning (intentionally set surface and ground fire) and burning of hand constructed piles. Associated activities include creating fire lines to prevent fire spread from treatment units as well as prevent the site-specific ignition of key habitat components, such as snags and down logs.

Mechanical Removal

Mechanical removal is a harvest activity, which, under the Dry Creek Project would primarily utilize ground-based equipment (tractors, feller bunchers, and some chainsaw work) to fell and remove identified trees while retaining and protecting desirable trees to accomplish stand level ecological restoration, habitat maintenance and enhancement, and fuels reduction objectives set within each treatment unit. A network of skid trails (in the case of ground-based thinning operations), landings, and, in some cases, temporary roads (which are removed following project activities) would be used to transport and collect harvested material. Equipment would operate on slopes generally less than 25 percent, however short pitches less than 150 feet long and up to 30 percent in slope could also be included in mechanical removal treatments. It should be noted that while most work is done primarily by machinery, there also is an inherent hand treatment component as well. For example some hand chainsaw work may be needed to protect specific trees of concern and partial tree girdling would also be done by hand, even in a mechanical removal area. Overall, conditions only warrant mechanical removal on 689 acres out of the 2,773 acres (approximately 25%) that are proposed for treatment. Furthermore, due to the concentrated nature of some of the prescriptions, portions of each unit proposed for mechanical work would not be directly affected by operations.

Hand Thinning and Piling

Hand thinning is an activity that utilizes crews with chainsaws or handsaws that cut understory conifers less than 16 inches dbh to accomplish fuels reduction, habitat maintenance and enhancement, and stand-level ecological restoration objectives set for the treatment unit. If hand felled material contributes to unacceptable fuel loading, this material may be hand piled outside the drip lines of desirable trees.

Mastication Thinning and Fuel Rearrangement

A masticator is a low ground pressure piece of equipment that “chews” up brush, small understory trees, and downed woody fuels to reduce competition and break up ladder fuels. The machine mechanically grinds and crushes this material and down woody fuels and distributes the resulting small pieces around the site. Mastication does not actually remove fuels from the treated area, but changes the size, continuity, and arrangement of the fuels, leading to an acceleration of decomposition rates of processed material and producing a desired change in fire behavior by reducing the amount of oxygen

within the fuel structure. Mastication changes a vertical large piece of fuel (i.e. a standing tree) into many smaller pieces of horizontal fuel. This is termed "*rearranging"* the fuels to a condition that allows the material to decompose more rapidly.

Pile Burning

After a hand or mechanical removal thin, residual activity fuels and some naturally occurring fuels are piled by hand into burn piles. Pile burning is designed to remove surface fuels, both fuels generated from treatments (activity fuels) and existing fuels on the ground. Pile burning is implemented by hand. In general, small down wood is placed in piles for future burning. Pile location and size is dictated by existing conditions, however piles would be preferentially placed outside of sensitive areas such as riparian conservation areas and cultural resource sites. Hand piles of fuels typically are burned under fall-like conditions, in winter months, or during periods of low fire danger. These conditions help to minimize the amount of mortality of remaining vegetation. This treatment method is used to mimic underburning where sensitive areas prevent unit-wide application of underburning.

Underburning

Underburning is a generalized term used when applying prescribed fire to large areas and is typically the treatment method for a SF - surface fuel treatment prescription. Underburning targets surface fuels, some understory, and, in rare cases, larger trees. Surface fuels are the primary agent of fire spread. The objective is to apply controlled fire under optimum conditions where the treatment can modify fuel conditions to effectively reduce fire behavior and the corresponding intensity of a future wildfire. Within some areas proposed for burning, the goal of the treatment may be to consume a significant portion of the existing surface fuels that could cause high wildfire intensities, and/or to consume the understory vegetation (ladder fuels) in order to reduce future fire severity and to create conditions that allow for future prescribed underburning opportunities. In other areas, underburning is used to create new growth of native shrub species and forage opportunities for wildlife. Underburning most closely mimics low-intensity fire that would occur under active fire conditions. Underburning, especially on south and west facing slopes, is typically conducted under spring-like conditions. A more mosaic burn pattern is created by underburning in spring-like conditions as compared to fall-like conditions; with some areas minimally burned and overall less fuel consumption. It is expected that on average, 30 percent of a given underburn unit would not actually be burned.

Underburning also requires the use of fire lines to contain prescribed fire. Fire lines are linear features that are cleared of vegetation and fuels down to mineral soil. Fire line construction practices take advantage of existing openings such as road or trails which can serve as effective fire lines. When constructed, fire lines are usually two to three feet wide when made by hand, however can be three to four feet wide when made by small machinery. If machinery is used, it cannot operate on slopes greater than 20 percent and it cannot operate in stream areas. Fire lines are expected to be constructed around portions of units 24, 28, 27, 31, and 58.

Prescription Metrics

As shown in Table 2 above, each treatment unit includes one or more of the 14 identified management emphasis areas. Application of the silvicultural/forest restoration and fire/fuels prescriptions described in the preceding section within a given treatment unit would be aligned with the treatment objectives previously described for each emphasis area within the unit. (Each emphasis area within a treatment unit is referred to as a subunit).

Metrics for post-treatment stand structure elements and tree species composition have been developed to guide application of the silvicultural/forest restoration and fire/fuels prescriptions within each emphasis area. Post-treatment stand structure elements include: (a) basal area; (b) mortality rates of trees; (c) canopy cover; (d) snag density, (e) large and small down woody material; (f) tree and shrub species composition of the stand; (g) dense cover areas (DCAs) and early seral openings (ESOs); (h) large isolated tree populations; and (i) predicted fire behavior under 90th percentile fire weather conditions. The site-specifically defined values for the metrics for each subunit are grounded in the scientific literature as well as Forest Plan direction related to emphasis area objectives. The Dry Creek Project record provides detailed citations for each defined metric, and this information is available from the Truckee Ranger District.

Post-treatment metric values for each emphasis area represent a range of outcomes that would vary by subunit as prescriptions were applied within the context of the existing stand's structure and tree species composition. For example, although prescriptions for subunits 53-NEF and 54-NEF are designed to meet the NEF (Forest Restoration - north/northeast facing slopes) emphasis area objectives, post-treatment stand conditions for subunit 54-NEF, which is a terraced plantation on a northeast-facing slope, would be different than those for subunit 53-NEF, which is a naturally regenerated stand.

The stand structure and species composition metrics apply at the subunit-scale. While these metrics can play out at other spatial scales (for example, microsite or landscape scales), they are meant to be applied at the subunit-scale. The prescriptions would be applied in the step-wise fashion by priority (as described in the "Order of Prescription Application" section above), with decisions regarding which trees to retain made at generally a microsite scale by field marking crews, especially for the large tree recruitment and variable density thinning prescriptions. The stand structure and species composition subunit-scale metrics would serve to limit and define the tree marking decision space. Data on the defined metrics would be gathered and assessed during the layout and tree marking phase of the project, with adjustments made to tree marking as necessary to align with emphasis area treatment objectives. This information would also be available to stakeholders and other interested individuals and groups, allowing feedback during the ongoing scoping process, with possibility of making incremental changes to the proposed action, as needed.

Detailed descriptions of each subunit's silvicultural/forest restoration and fire/fuels prescriptions and associated post-treatment stand structure and tree species composition metric values are included in the Dry Creek Project record. These detailed descriptions in the project record provide the site-specific information that would be used to guide application of the prescriptions on the ground. The sections below summarize key similarities and differences between the metrics for each emphasis area. Since

site conditions can vary, the current condition values also vary for these metrics. Ranges of values for metrics are shown below, as well as the weighted arithmetic mean (or weighted average) for these values. The weighted average accounts for the different unit sizes when average values are combined. *For all numbers displayed below, average values are actually the weighted arithmetic mean or weighted average.*

Basal Area

The metric for describing stand density is basal area, expressed in square feet per acre. When basal area is reduced, typically inter-tree competition is reduced. Emphasis area goals reflect targeted stand densities that would be representative of densities supported in stands with active fire. Goals would retain greater amounts of basal area in areas that would have supported higher stand densities under active fire; while treatments would concentrate greater amounts of basal area reductions in areas that might not have been able to support as much basal area. Existing subunit-scale basal areas are variable, both within and between emphasis areas, ranging between 70 and 172 square feet per acre across all subunits.

- Emphasis area treatment objectives would be expected to result in an average 12.7 percent reduction post treatment, resulting in a range of basal areas from 63 to 155 square feet per acre across all subunits. Reductions in basal area would not be evenly distributed across tree size classes (trees less than 12 inches dbh, trees between 12 and 23.9 inches dbh, and trees greater than 24 inches dbh). All trees greater than 26 inches dbh would be retained within all treatment units. For all emphasis areas, prescriptions focus on small and medium sized trees, guided by the emphasis area's goals. The majority of the retained basal area would be in the largest trees within each subunit.

Predicted Tree Mortality

Tree mortality is a natural function in forested stands. The levels and rates of mortality can be influenced by tree competition, climate change, and stand disturbances such as fire and insect activity. However, due to the unpredictable nature of climate change and disturbance, the project will only analyze tree mortality influenced by tree competition. When trees are in strong competition with one another for resources, the trees can become stressed and weakened, making them more susceptible to mortality. In these stands, mortality is often seen in smaller trees and at higher rates. In tree stands that experience minimal stressors, mortality would typically occur at the end of the tree's life cycle, when the tree is very old.

Tree mortality can be assessed by considering all tree mortality or by only including mortality in larger trees (trees greater than 24 inches dbh). The first mortality metric, percent of all mortality, is calculated by dividing the amount of tree volume that dies in a given year by the total tree volume present in that year. The second mortality metric, percent of mortality in trees greater than 24 inches dbh, is calculated by dividing the amount of individual trees greater than 24 inches that die in a given year by the total amount of individual trees that die in that year.

Emphasis area goals would move overall mortality to a lower rate overall and would increase the mortality rate of large trees compared to total mortality. This means that mortality rates would decrease to more sustainable rates over time; and that mortality is more concentrated in larger trees when it does happen. This trend is much more consistent with conditions associated with stands experiencing active fire and with stands with decreased competition allowing the trees to grow larger and die at the end of their life spans. This is opposed to high mortality rates in smaller size classes caused by competition for a limited amount of resources.

1. Currently overall average mortality in project area is 0.71 percent.
    - Modeled post treatment average mortality would decrease to 0.54 percent and after 30 years would be 0.35 percent.
2. Currently overall average mortality, specifically in large trees, compared to all mortality is 2.5 percent.
    - Modeled post treatment average mortality in larger trees would increase to 8.9 percent and after 30 years would be 35.8 percent.

Canopy Cover

Tree canopy cover retention would result from retaining basal area as described above. Canopy cover is a stand level average that indicates roughly the percentage of the forest floor that is vertically overtopped with tree canopy. The prescriptions are expected to result in varying canopy cover levels within each subunit. Current canopy cover ranges from 11 to 62 percent across subunits. Note that "canopy closure" values (a measure of the canopy hemisphere within an angle of view, i.e., a cone, over the sample point) within DCAs and other areas retaining clumps of trees would be in the 70 to 90 percent range, an objective for the microsite conditions desired for nesting and roosting sites.

- Where canopy cover was greater than 40 percent in current conditions, it would not be reduced to below 40 percent post treatment. The post treatment range for canopy cover would be ten to 57 percent. In most cases, canopy cover would decrease by a maximum seven percent, with the exception of 28-FLE (eleven percent), 53-SWF (nine percent), and 59-NEF (16 percent).

Snag Density

Emphasis area goals define the need for large snags. Large snags (greater than or equal to 15 inches dbh) would be retained within all subunits, regardless of emphasis area, however some areas are deficient in large snags and/or the stand's trees are not large enough to produce a large snag (many of the plantation stands). The current large snag levels range from zero to 4.4 (average 0.8) snags per acre.

- During the proposed project implementation, requirements would be in place to protect snags. Hand-constructed fire lines would be placed around large snags before implementing underburning treatment methods. In treatment units where pile burning would be conducted, piles would be located a sufficient distance from large snags to ensure the snags did not ignite during operations. In addition, for subunits 26-DRF, 27-NES, 28-FLE, 53-DRF, 53-NEF, and 53-SWF, the Decadent Feature Enhancement (DFE) prescription would be applied where trees would be girdled to create snags. This would increase the overall numbers of large snags in the project area. It is recognized that small snags (less than 15 inches dbh) will likely be created in

units proposed for underburning. While these snags will not contribute to emphasis area goals for large snags, they provide a future small down woody material source.

Down Woody Material

Emphasis area goals define the need for large down logs and for smaller down woody material. In all subunits, regardless of emphasis area, large down logs (greater than or equal to 15 inches diameter and ten feet long) would be retained during implementation of silvicultural/ forest restoration treatments because the crushing of large down logs with machinery would be avoided. Fire/fuels prescriptions are designed to retain specified levels of down woody material, commensurate with emphasis area goals.

1. Current conditions of large down logs range from zero to 15 per acre with an average of 3.6 per acre. The highest numbers of current down logs occur in units 24, 26, 28, 74, 75, and 76; these are the only units that exceed five large down logs per acre.
    - Post treatment, large down logs per acre would not decrease in most units. All units with greater than five large down logs per acre will retain at least five logs per acre post treatment. While many large down logs would be protected with hand lines prior to any underburning, it is assumed some will be consumed. In units 24, 28, and 58 specifically, it is expected that the overall numbers of large down logs would decrease, but values would still average 4-5 large down logs per acre.
2. Current conditions of small down wood (greater than three inches diameter) average 11.2 pieces per acre with a range of zero to 51 pieces. The largest amounts of small down wood are found in units 26, 74, 75, and 76.
    - Post treatment, the average number of small down wood pieces would decrease to 7.3 per acre. This is due to some material being consumed during pile burn and underburning treatment methods, however underburning on average would not affect 30 percent of a given treatment unit. In addition, it is expected that some small down wood would be generated during underburning due to the burning of small trees that would contribute to small down wood numbers. It is also expected that other small down wood (smaller than three inches) would actually increase in mastication units.

Tree and Shrub Species Composition

Site-specific objectives for tree and shrub species composition are based on existing species composition within the subunits as compared to emphasis area goals.

1. Currently, of all trees present in the stands, on average 76 percent are either Jeffrey pine or ponderosa pine and 23 percent are either white fir or red fir. In the Dry Creek project area, stands with active fire would have relatively few firs and be dominated by pines.
    - Post treatment, the percentage of pines would increase and the percentage of firs would decrease, primarily because much of the proposed tree removal would remove suppressed trees. In these stands, suppressed trees are mostly firs that have grown in with active fire exclusion. Post treatment the percentage of pines would increase to an average of 86 percent and firs would decrease to an average of 12 percent.

2. Currently, the sizes of trees are also weighted towards small trees (less than 12 inches dbh) because active fire has not thinned the smaller trees out. Small trees average 366 pine trees per acre (TPA) and 122 fir TPA. Medium trees (12 to 24 inches dbh) and larger trees (greater than 24 inches dbh) also vary between pines and firs with average 39.7 medium and 2.88 larger pine TPA and 3.03 medium and 0.2 larger fir TPA.
    - Post treatment, the average TPA in larger trees fractionally shifts to 2.84 pines and 0.19 firs, while the medium trees change to an average of 37.4 pine TPA and 2.72 fir TPA. The largest change is in the small trees with post treatment average of 89 pine and 20 fir TPA. This reflects that the majority of trees proposed for removal are under 12 inches dbh.
3. For shrub species composition in the stands, it is desirable to have some understory of brush and some percentage of brush in openings. This can represent a desirable early seral stage, especially when it is spatially located in openings and not contributing to ladder fuels. Overall bitterbrush is preferred, especially in openings as it is a shade-intolerant species and highly desirable as browse for wildlife. In the current condition, when all species of shrubs are considered, there are three species that dominate the overall shrub composition within the units. The current condition as a percent of all brush species includes bitterbrush at ten to 75 percent (average 33), snowbrush at ten to 80 percent (average 54), and manzanita ten to 30 percent (average 13).
    - Prescriptions are designed to selectively remove some brush to move the shrub composition to be more heavily weighted to bitterbrush. Post treatment composition would be bitterbrush at 35 to 85 percent (average 56), snowbrush at ten to 55 percent (average 34), and manzanita at five to 15 percent (average 10) of the percent composition of all brush species.

Dense Cover Areas and Early Seral Openings

Emphasis area goals target varying acres of DCAs and/or ESOs within each subunit.

1. Currently many areas of units are uniformly quite dense, with up to 80 percent of a given area considered dense enough to have similar conditions as a DCA. Areas of this degree of density may not be representative of stand conditions that would occur with active fire. Typically areas with more dense stands would occur on north/northeast facing slopes or in drainage bottoms. However currently some areas like ridgetops and south/southwest facing slopes are very dense, for example the current dense condition in 54-RIF, 54-SWF, 56-RIF, and 56-SWF is estimated at 80 percent.
    - Post treatment, DCAs range from zero to 15 percent, varying by emphasis area (subunit) targets. The values are designated based on likely stand conditions that would develop with active fire. In addition, other emphasis area goals such as recreation and powerline management and low intensity fire areas are considered when applying DCAs. The highest percentages of DCAs (ten to 15 percent of a subunit) would occur in emphasis areas NEF, NES, FLE, and DRF. No DCAs are prescribed for emphasis areas RIF, ASF, LTG, DRR, NER, SWR, POW, and LOW.

2. The current condition of unit areas that function similar to ESOs ranges from zero to 50 percent (average 14 percent) in early seral stages. This current condition is closer to emphasis area targets overall as compared to DCAs. Therefore the ESO prescription is only applied to a smaller number of the subunits based on comparison with emphasis area goals.
    - Seven subunits would have changes in ESO percentages. Post treatment, in these seven subunits, the percentage of the subunit acres in ESOs would increase to five to 15 percent. See Table 2 above for the subunits with an ESO prescription.

Large Isolated Tree Population

As discussed above in the LTR – large tree recruitment prescription, an isolated tree is defined by being located at least 20 feet (6 meters) away from the bole of any neighboring tree and no more than 50 feet (15 meters) from the bole of any neighboring tree. The ratio of isolated trees compared to groupings of trees, more dense cover areas (DCAs), and unencumbered early seral openings (ESOs), however, would fluctuate as stand's topographic position on the landscape changes. Current conditions reflect very few trees meeting the definition of an isolated tree. On average only 0.6 percent of trees within the units meet the definition, with the range of zero to 15 percent. However the 15 percent only occurs in seven acres of the LTG – legacy tree grove emphasis area unit 74-LTG. The majority of units contain no trees meeting the definition.

- The prescriptions are designed to increase the number of isolated trees within treatment areas. Post treatment the average percentage increases to three percent across the units, also with the range of zero to 15 percent. The highest percentages would occur in units 27, 28, 53, 58, and 76.

Predicted Fire Behavior

Metrics are used to define post treatment targets as compared to current conditions in relation to predicted wildland fire behavior at 90^{th} percentile fire weather conditions: 1) predicted spatial extent of ground fire, passive crown fire, and active crown fire; 2) predicted flame lengths in three categories (less than four feet, four to eight feet, and greater than eight feet); 3) predicted rates of spread in three categories (less than five chains per hour, five to 50 chains per hour, and greater than 50 chains per hour); and 4) predicted mortality of fir and pine trees in three size classes (less than 12 inches dbh, 12-24 inches dbh, greater than 24 inches dbh).

1. The current conditions of predicted spatial extent of fire types range from two to 78 percent (average 33) ground fire, 22 to 75 percent (average 45) passive crown fire, and zero to 73 percent (average 22) active crown fire. The higher percentages of ground fire are in units 31 and 52 and the higher percentages of active crown fire are in unit 56.
    - The prescriptions are designed to move the predicted post treatment fire type to primarily ground fire; ranging 84 to 99 percent (average 94 percent) overall in all units. The maximum predicted passive crown fire is nine percent in 53-DRF and 54-DRF, with overall unit average of four percent. The maximum predicted active crown fire is 11 percent in 56-DRF, although the average is one percent across all units.
2. The current conditions of predicted flame lengths range from zero to 38 percent (average 10) less than four feet, one to 98 percent (average 61) four to eight feet, and zero to 38 percent

(average 10) in greater than eight foot flame lengths. The higher percentages of medium flame lengths are in units 54, 56, and 60, with the highest flame lengths in units 26, 74, 75, and 76.

- The prescriptions are designed to move the predicted post treatment flame lengths to primarily less than four feet; average 82 percent overall in all units. For predicted flame lengths of four to eight and greater than eight feet, the averages are 12 and six percent respectively.

3. For predicted rates of spread, the current conditions range from 48 to 97 percent (average 80) less than five chains per hour, one to 81 percent (average seven) five to 50 chains per hour, and one to 98 percent (average 11) in greater than 50 chains per hour. The highest rates of spread are in units 54 and 56 on the south/southwest facing slopes and ridgetops (SWF and RIF emphasis areas).
    - The prescriptions are designed to move the predicted post treatment rates of spread to lower values; primarily less than five chains per hour. The predicted post treatment values changed to an average of 83, 11, and six percent for the categories of less than five chains per hour, five to 50 chains per hour, and greater than 50 chains per hour respectively.
4. For predicted pine and fir mortality, the current conditions reflect high mortalities in the smaller size classes but also relatively high percentages of larger pine mortality due to the ladder fuels at 90th percentile weather conditions. Values average 81, 21, and 19 percent mortality in firs less than 12 inches dbh, 12-24 inches dbh, greater than 24 inches dbh, respectively. For pines, the same respective predicted values are 76, 60, and 49 percent.
    - The prescriptions are designed primarily to decrease the predicted post treatment mortality rates of pines in the three size classes. The predicted post treatment values changed to an average of 41, 14, and ten percent for less than 12 inches dbh, 12-24 inches dbh, greater than 24 inches dbh size classes, respectively. For firs, the predicted post treatment mortality rates are 52, three, and two percent for the same classes. The overall lower mortality in medium to large firs reflects the current condition that there are much fewer of them on the landscape versus medium and large pines.

Standard Management Requirements

Standard Management Requirements (SMRs) are Best Management Practices (BMPs), mitigations, Resource Protection Measures (RPMs), standard contract provisions, and special operating provisions designed to minimize or negate any potential adverse effects associated with all planned activities. The complete list of SMRs will be included in Appendix A of the Environmental Assessment (EA). General practices, types, or categories of SMRs are listed below. This general list is intended to provide an overview of the SMRs that will be listed in detail in Appendix A, it is not all inclusive. Appendix A will be developed based on the analyses of effects completed by specialists in these resource areas.

Air Quality

Requirements such as obtaining burning permits from the Northern Sierra Air Quality Management District, and conditions under which burning would/would not occur are typically listed.

Aquatic Resources

Consistent with Forest Plan direction, a Riparian Conservation Objective (RCO) analysis will occur as part of the project design. The analysis identifies Riparian Conservation Areas (RCAs) and restrictions and mitigations for RCAs, a summary of which is usually placed in the SMR table. The RCO analysis is typically tied in with Best Management Practices (BMPs) as well. In addition, species specific mitigation is listed in the table.

Cultural Resources

Typical protection measures for cultural resources usually involve avoidance of sites by machinery, restrictions on ground disturbing activities, and depending on site type, restrictions on types of prescribed fire.

Hydrology

As with Aquatic Resources, the RCO analysis mitigations and BMPs (including Regional and National) are typically detailed for hydrology resources in the table. Equipment avoidance areas, erosion control measures, limits on operations based on slope, stream crossing requirements, and timing of operations are detailed. In addition, the SMR table lists requirements regarding the maintenance of beneficial uses of water as detailed in the Little Truckee River Hydrologic Unit Basin Plan for the Lahontan Regional Water Quality Control Board (LRWQCB). In addition, LRWQCB requirements are covered under operating waivers and include monitoring and provisions for an action plan.

Non-Native Invasive Plants

Standard non-native invasive plant (noxious weed) mitigations involve the requirements for equipment cleaning when coming from or moving between known weed sites, and the use of weed-free erosion control or road materials.

Prescribed Fire

Conditions under which burning would occur, requirements for residual ground cover and down logs, snag protection measures, measures to protect desirable large down wood components , and measures to protect other resources are detailed.

Sensitive Plants

Standard mitigations for sensitive plants involve a “flag and avoid” strategy to prevent ground disturbance.

Soils

As with Aquatic and Hydrology Resources, the RCO analysis mitigations and BMPs are typically detailed for soils resources in the table. Limitations for soil dryness, equipment avoidance areas, erosion control measures, ground cover requirements, limits on operations based on soil type, measures to maintain soil productivity are detailed.

Transportation
Specifying pre- and post-project road maintenance, wet weather restrictions, reconstruction and/or decommissioning requirements, and erosion control measures are typical requirements relating to transportation management.

Vegetation Management
Operating procedures including skid trail and landing layout and requirements, erosion control measures, operations avoidance areas, contract provisions, and limitations on equipment operations are listed in the SMR table.

Wildlife
Requirements for the retention of habitat features such as large trees, down logs, or snags, limitations on operating seasons/locations, and species specific mitigations are detailed.

Responsible Official

The Dry Creek Project is located on NFS lands managed by the Truckee Ranger District, Tahoe National Forest. The Truckee District Ranger is the Decision Maker or Responsible Official for this project.

Preliminary Alternative Also Being Considered

In addition to the Proposed Action described in this document, one additional alternative is preliminarily being considered for analysis. This alternative is not fully developed however a summary is presented below.

Alternative 2 (No Action)

Under the No Action Alternative, none of the activities proposed under the Proposed Action (Alternative 1) would be implemented. The No Action Alternative would not preclude activities that had already been approved in the larger Dry Creek project area or any others that may be planned as separate projects.

Acronyms Used

BA – Basal area
BMP – Best Management Practice
CC – Canopy closure
DCA - dense cover area
dbh – diameter at breast height
EA – environmental assessment
ESO - early seral opening
FRI – fire return interval
FRID - California Fire Return Interval Departure map project
FVS – Forest Vegetation Simulator
GIS – geographic information system
GPS – Global positioning system
GTR – General Technical Report
HUC – Hydrologic Unit Code
LRMP – Land and Resource Management Plan
LRWQCB - Lahontan Regional Water Quality Control Board
NFS – National Forest System
OET - Overland Emigrant Trail
OHV – Off-highway vehicle
PAC - protected activity center (for northern goshawk)
RCA - Riparian Conservation Area
RCO - Riparian Conservation Objective
RPM - resource protection measure
FSR – Forest System Road
SMR – standard management requirement
SNFPA ROD - Sierra Nevada Forest Plan Amendment Record of Decision
SNW&LC - Sierra Nevada Wood and Lumber Company
TPA – trees per acre
USDA – United States Department of Agriculture
WUI – wildland urban interface

Emphasis Area and Prescription/Method Specific Acronyms/Shortnames

ASF - Forest Restoration Emphasis Area - aspen
ASP – Aspen Restoration prescription
DCA – Dense Cover Area prescription
DFE – Decadent Feature Enhancement prescription
DRF - Forest Restoration Emphasis Area -drainage bottoms
DRR - Recreation Emphasis Area – drainage bottoms
ESO – Early Seral Opening prescription
FLE - Wildlife Habitat Emphasis Area – northern goshawk post-fledging
LF – Ladder Fuel prescription
LOW - Low Intensity Fire Emphasis Area
LTG - Forest Restoration Emphasis Area - legacy tree grove
LTR – Large Tree Recruitment prescription
LTT – Legacy Tree Treatment prescription
NEF - Forest Restoration Emphasis Area - north/northeast facing slope
NER - Recreation Emphasis Area - north/northeast facing slope
NES - Wildlife Habitat Emphasis Area - northern goshawk nesting
VDT – Variable Density Thin prescription
PAC - Wildlife Habitat Emphasis Area - northern goshawk Protected Activity Center
POW - Powerline Safety Emphasis Area
PT – Plantation Thin prescription
RIF - Forest Restoration Emphasis Area - ridge top
SC – Suppressed Cut prescription
SF – Surface Fuel prescription
SWF - Forest Restoration Emphasis Area - south/southwest facing slope
SWR - Recreation Emphasis Area - south/southwest facing slope

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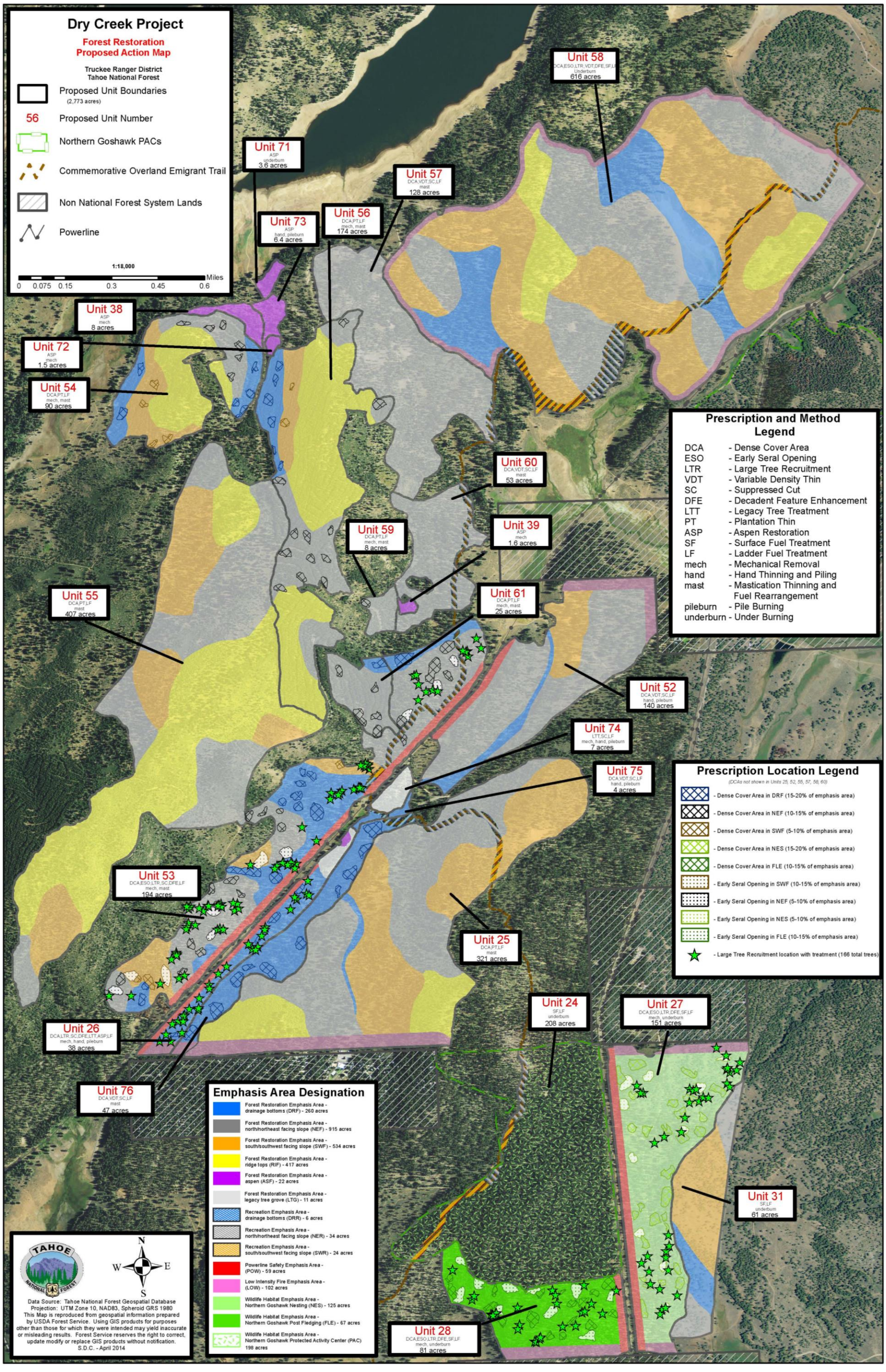
Appendix A


Dry Creek Project
Forest Restoration
Proposed Action Map
Truckee Ranger District
Tahoe National Forest
Proposed Unit Boundaries
(2,773 acres)
56
Proposed Unit Number
Northern Goshawk PACs
Commemorative Overland Emigrant Trail
Non National Forest System Lands
Powerline
1:18,000
0 0.075 0.15 0.3 0.45 0.6 Miles
Unit 58
DCA,ESO,LTR,VDT,DFE,SF,LF
Underburn
616 acres
Unit 71
ASP
underburn
3.6 acres
Unit 57
DCA,VDT,SC,LF
mast
128 acres
Unit 73
ASP
hand, pileburn
6.4 acres
Unit 56
DCA,PT,LF
mech, mast
174 acres
Unit 38
ASP
mech
8 acres
Unit 72
ASP
mech
1.5 acres
Unit 54
DCA,PT,LF
mech, mast
90 acres
Unit 60
DCA,VDT,SC,LF
mast
53 acres
Unit 59
DCA,PT,LF
mech, mast
8 acres
Unit 39
ASP
mech
1.6 acres
Unit 55
DCA,PT,LF
mast
407 acres
Unit 61
DCA,PT,LF
mech, mast
25 acres
Unit 52
DCA,VDT,SC,LF
hand, pileburn
140 acres
Unit 74
LTT,SC,LF
mech, hand, pileburn
7 acres
Unit 75
DCA,VDT,SC,LF
hand, pileburn
4 acres
Unit 53
DCA,ESO,LTR,SC,DFE,LF
mech, mast
194 acres
Unit 25
DCA,PT,LF
mast
321 acres
Unit 24
SF,LF
underburn
208 acres
Unit 27
DCA,ESO,LTR,DFE,SF,LF
mech, underburn
151 acres
Unit 26
DCA,LTR,SC,DFE,LTT,ASP,LF
mech, hand, pileburn
38 acres
Unit 76
DCA,VDT,SC,LF
mast
47 acres
Unit 31
SF,LF
underburn
61 acres
Unit 28
DCA,ESO,LTR,DFE,SF,LF
mech, underburn
81 acres
Prescription and Method Legend
DCA - Dense Cover Area
ESO - Early Seral Opening
LTR - Large Tree Recruitment
VDT - Variable Density Thin
SC - Suppressed Cut
DFE - Decadent Feature Enhancement
LTT - Legacy Tree Treatment
PT - Plantation Thin
ASP - Aspen Restoration
SF - Surface Fuel Treatment
LF - Ladder Fuel Treatment
mech - Mechanical Removal
hand - Hand Thinning and Piling
mast - Mastication Thinning and Fuel Rearrangement
pileburn - Pile Burning
underburn - Under Burning
Prescription Location Legend
(DCAs not shown in Units 25, 52, 55, 57, 58, 60)
- Dense Cover Area in DRF (15-20% of emphasis area)
- Dense Cover Area in NEF (10-15% of emphasis area)
- Dense Cover Area in SWF (5-10% of emphasis area)
- Dense Cover Area in NES (15-20% of emphasis area)
- Dense Cover Area in FLE (10-15% of emphasis area)
- Early Seral Opening in SWF (10-15% of emphasis area)
- Early Seral Opening in NEF (5-10% of emphasis area)
- Early Seral Opening in NES (5-10% of emphasis area)
- Early Seral Opening in FLE (10-15% of emphasis area)
- Large Tree Recruitment location with treatment (166 total trees)
Emphasis Area Designation
Forest Restoration Emphasis Area - drainage bottoms (DRF) - 260 acres
Forest Restoration Emphasis Area - north/northeast facing slope (NEF) - 915 acres
Forest Restoration Emphasis Area - south/southwest facing slope (SWF) - 534 acres
Forest Restoration Emphasis Area - ridge tops (RIF) - 417 acres
Forest Restoration Emphasis Area - aspen (ASF) - 22 acres
Forest Restoration Emphasis Area - legacy tree grove (LTG) - 11 acres
Recreation Emphasis Area - drainage bottoms (DRR) - 6 acres
Recreation Emphasis Area - north/northeast facing slope (NER) - 34 acres
Recreation Emphasis Area - south/southwest facing slope (SWR) - 24 acres
Powerline Safety Emphasis Area - (POW) - 59 acres
Low Intensity Fire Emphasis Area - (LOW) - 102 acres
Wildlife Habitat Emphasis Area - Northern Goshawk Nesting (NES) - 125 acres
Wildlife Habitat Emphasis Area - Northern Goshawk Post Fledging (FLE) - 67 acres
Wildlife Habitat Emphasis Area - Northern Goshawk Protected Activity Center (PAC) 198 acres
TAHOE NATIONAL FOREST
N
W E
S
Data Source: Tahoe National Forest Geospatial Database
Projection: UTM Zone 10, NAD83, Spheroid GRS 1980
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S.D.C. - April 2014